"A STUDY ON OUTCOMES AND EFFICACY OF MANAGING ACUTE PANCREATITIS BASED ON GUIDELINES GIVEN BY AMERICAN COLLEGE OF GASTROENTEROLOGY

A DISSERTATION SUBMITTED TO

THE TAMILNADU DR.MGR MEDICAL UNIVERSITY

In partial fulfilment of the regulations for the award of the

Degree of M.S (GENERAL SURGERY)

BRANCH-1

DEPARTMENT OF GENERAL SURGERY

STANLEY MEDICAL COLLEGE AND HOSPITAL

TAMILNADU DR.MGR MEDICAL UNIVERSITY,

MAY 2018

DECLARATION

I **Dr.R.M.VAISHNAVI** solemnly declare that this dissertation titled "**A STUDY ON OUTCOMES AND EFFICACY OF MANAGING ACUTE PANCREATITIS BASED ON GUIDELINES GIVEN BY AMERICAN COLLEGE OF GASTROENTEROLOGY"** is a bonafide work done by me in the department of general surgery, Govt. Stanley Medical College and Hospital, Chennai under the supervision of **Prof. Dr. J.LALITH KUMAR** and my Head of the Department **Prof. Dr.A.K.RAJENDRAN.** This dissertation is submitted to the Tamilnadu Dr MGR Medical university, Chennai in partial fulfilment of the university regulations for the award of M.S.degree (General Surgery), branch – 1 examination to be held in MAY 2018

OCTOBER 2017 **Dr. R.M.VAISHNAVI**

CHENNAI

CERTIFICATE

This is to certify that the dissertation entitled **"A STUDY ON OUTCOMES AND EFFICACY OF MANAGING ACUTE PANCREATITIS BASED ON GUIDELINES GIVEN BY AMERICAN COLLEGE OF GASTROENTEROLOGY"** is a bonafide work done by Dr.R.M.VAISHNAVI post graduate (2015-2018) in the department of general surgery, Govt. Stanley Medical College and Hospital, Chennai under my direct guidance and supervision, in partial fulfilment of the regulations of the TAMILNADU Dr. MGR MEDICAL UNIVERSITY Chennai for the award of M.S degree(General surgery) Branch-1 examination to be held in MAY 2018.

Prof. Dr.A.K.Rajendran
Professor and Head of Department
Dept.of general surgery
Stanley medical college
Chennai 1

Prof. Dr. Ponnambala namasivayam
The Dean
Stanley medical college
Chennai 1

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ETHICAL COMMITTEE APPROVAL

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Title of the Work	:	A study on outcome and efficacy of managing acute pancreatitis based on guidelines given by American College of Gastroenterologists.
Principal Investigator	:	Dr. Vaishnavi. R. M
Designation	:	PG MS (General Surgery)
Department	:	Department of General Surgery Government Stanley Medical College, Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 02.12.2016 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

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INTRODUCTION

Acute pancreatitis is defined as an acute inflammatory process of the pancreas that frequently involves peripancreatic tissues and / or remote organ systems. With Increasing incidences of Acute Pancreatitis and its fulminant nature of progression, it has become mandatory to adopt Guidelines, adherence of which produces Optimum results.

The study will be based on seeing the efficacy and recovery of patients diagnosed with acute pancreatitis by adopting the guidelines given by American College of Gastroenterologists.

Guidelines adopted in our unit, Department of General Surgery for the management of acute pancreatitis (AP) are based on the Western experience. The guidelines have been applied in our setup with available resources. Before applying the guidelines in our patients, thorough study was done and many literatures reviewed.

Many studies are showing that American Guidelines are difficult to extrapolate in our Indian Setting, but I have shown in this study that the Guidelines given by American College of Gastroenterologists can be applied in our set up also and adherence of Guidelines based management decreases the morbidity and mortality of patients with acute pancreatitis. The statistics and the results of the guidelines based approach is given in the later pages of this dissertation.

GROSS ANATOMIC CONSIDERATIONS OF PANCREAS

The adult human pancreas weighs about 80 g. FIGURE 1 shows the anatomical relationship between the pancreas and rest of the organs surrounding it in the abdomen. The pancreas is a retroperitoneal organ and it does not have a capsule. The second and third portions of the duodenum curve around the head of the pancreas. The spleen is adjacent to the pancreatic tail. The regions of the pancreas are the head, body, tail and uncinate process and vasculature is given in FIGURE 2. The distal end of the common bile duct passes through the head of the pancreas and joins the pancreatic duct entering the duodenum (FIGURE 1). For this reason, pathologic processes of the pancreas, such as a cancer at the head of the pancreas or swelling and/or scarring of the head of the pancreas due to pancreatitis, can lead to biliary system obstruction and injury.

Diseases, such as pancreatitis and pancreatic cancer, can involve the splenic vein leading to its thrombosis and vascular engorgement of the spleen due to the obstruction of venous blood flow.

The pancreas is innervated by both the parasympathetic and sympathetic nervous systems. The efferent parasympathetic system is contained within the branches of the vagus nerve that originates in the dorsal vagal complex (tenth cranial nerve nucleus) of the brain. The terminal branches of the vagus synapse with intrapancreatic ganglia. The postganglionic fibers innervate both exocrine and endocrine structures. The sympathetic innervation orginates in the lateral

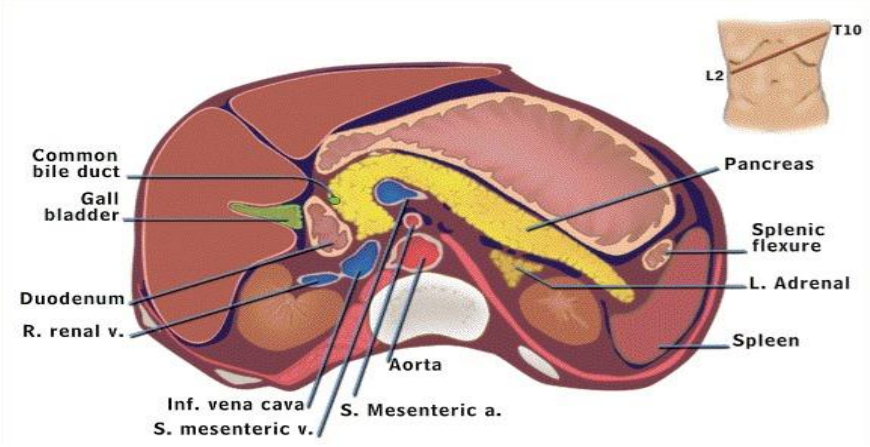

FIGURE 1

Cross-sectional anatomy of the pancreas. This diagram represents the anatomical features of a "slice" of the abdomen at the level depicted in the upper right hand corner of the figure. Anterior to the pancreas are the stomach, colon, omentum and loops of small intestine. Posterior to the pancreas are the portal vein, inferior vena cava, aorta, superior mesenteric artery and vein, kidneys and vertebrae. The distal common bile duct passes through the head of the pancreas. Adapted from Gorelick F, Pandol, SJ, Topazian M. *Pancreatic physiology, pathophysiology, acute and chronic pancreatitis*. Gastrointestinal Teaching Project, American Gastroenterologic Association. 2003.

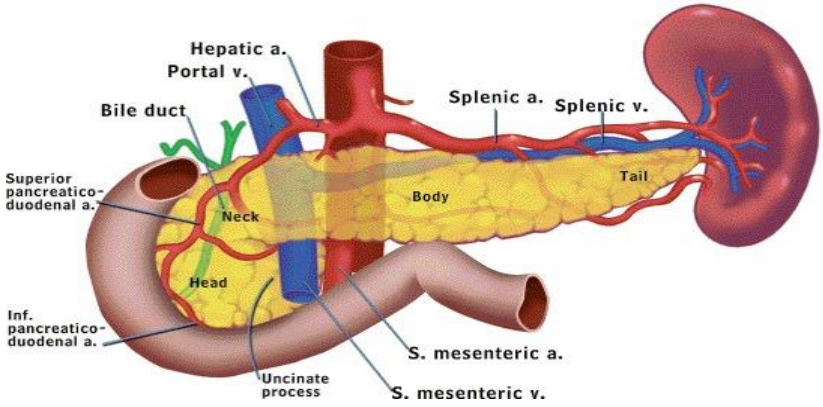

FIGURE 2

Pancreatic vascular system. The arterial blood supply to the pancreas is from two major arteries supplying the abdominal organs, the celiac and superior mesenteric arteries. The celiac artery branch supplying the pancreas is the superior pancreaticoduodenal artery. The superior mesenteric artery branch supplying the pancreas is the inferior pancreaticoduodenal artery. Venous drainage of the pancreas is via the splenic vein and the superior mesenteric vein emptying into the portal vein. Adapted from Gorelick F, Pandol, SJ, Topazian M. *Pancreatic physiology, pathophysiology, acute and chronic pancreatitis*. Gastrointestinal Teaching Project, American Gastroenterologic Association. 2003.

grey matter of the thoracic and lumbar spinal cord. The bodies of the postganglionic sympathetic neurons are located in the hepatic and celiac plexuses. The postganglionic fibers innervate blood vessels of the pancreas.

FUNCTIONAL ANATOMIC CONSIDERATIONS

It is important to point out that there are important interrelationships between the endocrine (islets of Langerhans) and exocrine pancreas(Acinar cell and duct tissue). The illustration in FIGURE 3 points out this relationship. The exocrine portion, comprising 85% of the mass of the pancreas, secretes digestive enzymes, water and $NaHCO_3$ into the duodenum. The endocrine portion secretes its hormones into the blood stream. The blood flow from the endocrine pancreas passes to the exocrine pancreas before entering the general circulation.

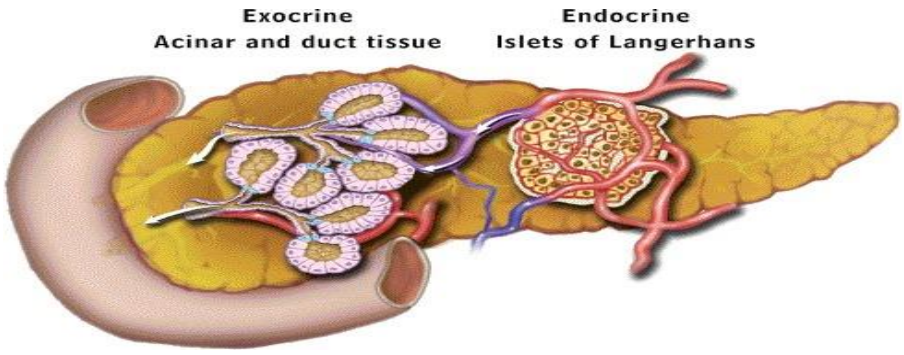

FIGURE 3

The exocrine and endocrine pancreas.

Anatomic studies demonstrate that the blood flow from the endocrine pancreas enters the capillaries of the exocrine tissue surrounding each of the islets before entering the general circulation. This “portal” system provides for the delivery of very high concentrations of hormones from the islets of Langerhans to the exocrine tissue surrounding the Islets. The hormones from the islets of Langerhans include insulin, amylin, glucagon, somatostatin and pancreatic polypeptide. Although the full significance of the effects of these hormones on the exocrine pancreas is not known, the acinar cells of the pancreas have insulin receptors that are involved in regulation of digestive enzyme synthesis of the exocrine pancreas.

The functional unit of the exocrine pancreas is composed of an acinus and its draining ductule (FIGURE 3). The ductal system extends from the lumen of the acinus to the duodenum. A ductule from the acinus drains into interlobular (intercalated) ducts, which in turn drain into the main pancreatic ductal system.

The acinus (from the Latin term meaning “berry in a cluster”) can be spherical or tubular (FIGURE 3) or can have some other irregular form. The acinar cells of the acinus are specialized to synthesize, store, and secrete digestive enzymes. On the basolateral membrane are receptors for hormones and neurotransmitters that stimulate secretion of the enzymes. The basal aspect of the cell contains the nucleus as well as abundant rough endoplasmic reticulum for protein synthesis. The apical region of the cell contains zymogen granules and store digestive

enzymes. The apical surface of the acinar cell also possesses microvilli. Within the microvilli and in the cytoplasm underlying the apical plasma membrane is a filamentous actin meshwork that is involved in exocytosis of the contents of the zymogen granules. Secretion is into the lumen of the acinus, which is connected to the ductal system. Tight junctions between acinar cells form a band around the apical aspects of the cells and act as a barrier to prevent passage of large molecules, such as the digestive enzymes. The junctional complexes also provide for the paracellular passage of water and ions.

Another intercellular connection between acinar cells is the gap junction. This specialized area of the plasma membrane between adjacent cells acts as a pore to allow small molecules (molecular weight 500 to 1000 Da) to pass between cells. The gap junction allows chemical and electrical communication between cells.

The duct cell epithelium consists of cells that are cuboidal to pyramidal and contain the abundant mitochondria necessary for energy products needed for ion transport (FIGURE 4). Another cell that is situated at the junction of the acinus and ductule is the centroacinar cell. This cell has ductal cell characteristics but is also likely a progenitor for different cell types for the pancreas. The duct cells as well as the centroacinar cells contain carbonic anhydrase, which is important for their ability to secrete bicarbonate .

Another cell that is becoming important because of its role in pathologic states is the pancreatic stellate cell (PaSC). This is a very slender star-shaped (hence the name stellate) cell that drapes itself around the acinar and ductular structures as well as the islets of Langerhans. The role of PaSCs in normal function is probably to lay down the basement membrane to direct proper formation of the epithelial structures. Their role in pathologic states, such as chronic pancreatitis and pancreatic cancer, has been of considerable interest. In these diseases, the PaSC is trans-formed into a proliferating myofibroblastic cell type that synthesizes and secretes extracellular matrix proteins, proinflammatory cytokines and growth factors. These actions of the transformed PaSCs are central to the inflammatory and fibrosing pathologic processes of chronic pancreatitis and are procarcinogenic for pancreatic cancer. In fact, the myofibroblastic transformed state of the PaSC is emerging as a key participant in both the rate of growth of the cancer and the development of resistance to Chemotherapy.

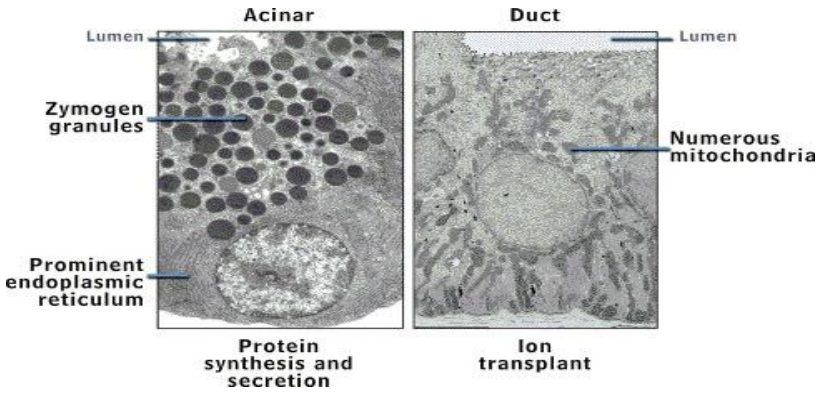

FIGURE 4 : Ultrastructure of acinar and duct cells of the exocrine pancreas.

DIGESTIVE ENZYMES AND THEIR FUNCTIONS

The human pancreas has the largest capacity for protein synthesis of any organ in the human body. Much of the capacity is devoted to synthesis of the digestive enzymes that are secreted in the intestinal lumen. Some of the enzymes are present in more than one form (e.g., cationic trypsinogen, anionic trypsinogen and mesotrypsinogen). Further, they are capable of digesting the cell and causing significant damage. There are mechanisms to prevent these enzymes from potentially digesting the pancreas including storage and packing in acidic zymogen granules to inhibit activity; and synthesis and storage as inactive precursor forms. Activation of these enzymes takes place in the surface of the duodenal lumen, where a brush-border glycoprotein peptidase, enterokinase, activates trypsinogen by removing (by hydrolysis) an N-terminal hexapeptide fragment of the molecule (Val–Asp–Asp–Asp–Asp–Lys) . The active form, trypsin, then catalyzes the activation of the other inactive proenzymes. Presumably, these enzymes would not cause pancreatic cellular damage if released into the pancreatic cell/tissue because there is no starch, glycogen or triglyceride substrate for these enzymes in pancreatic tissue.

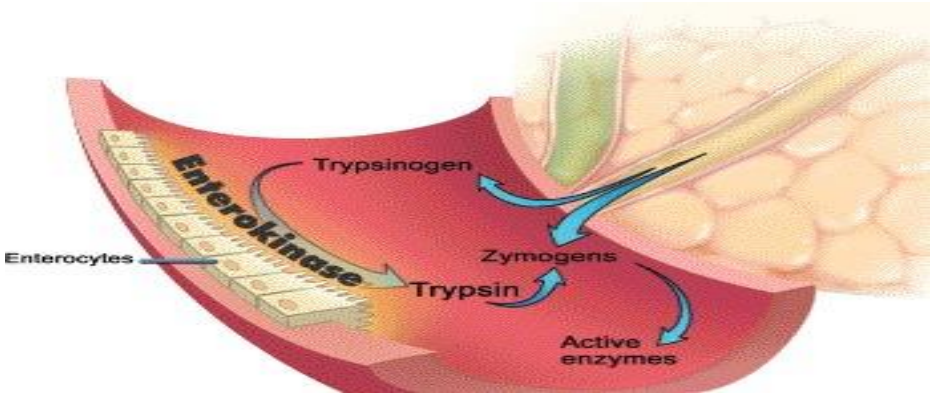

FIGURE 5 : Intestinal digestive enzyme activation.

Another mechanism that the exocrine pancreas utilizes to prevent intracellular activation involves the synthesis and incorporation of a trypsin inhibitor (pancreatic secretory trypsin inhibitor [PSTI]) into the secretory pathway and zymogen granule. PSTI is a 56-amino acid peptide that inactivates trypsin by forming a relatively stable complex with the enzyme near its catalytic site. The function of the inhibitor is to inactivate trypsins that are formed autocatalytically in the pancreas or pancreatic juice, thus, preventing pancreatic digestion and resulting disorders, such as pancreatitis. In the following paragraphs are descriptions of the functions of the major digestive enzymes.

Amylase is secreted by both the pancreas and salivary glands, differing in molecular weight, carbohydrate content and electrophoretic mobility. However, they have identical enzyme activities. Salivary amylase initiates digestion in the mouth and may account for a significant portion of starch and glycogen digestion because it is transported with the meal into the stomach and small

intestine, where it continues to have activity. Optimal enzyme activity occurs at neutral pH. During a meal, gastric pH can approach neutrality despite gastric acid secretion because of the buffering from molecules in the meal as well as alkaline secretions from the salivary glands and gastric mucus. Salivary amylase can contribute up to 50% of starch and glycogen digestion while pancreatic amylase contributes the remainder. The brush-border enzymes complete the hydrolysis of the products of amylase digestion to glucose. The final product, glucose, is transported across the intestinal absorptive epithelial cell by a Na^+-coupled transport.

Lipases are secreted mainly by the pancreas in contrast to amylase where there is a significant salivary contribution. There are lingual and gastric lipases but these contribute to fat digestion in only a minor fashion. Major lipases secreted by the pancreas are lipase (or triglyceride lipase) and prophospholipases.

Pancreatic lipase hydrolyzes a triglyceride molecule to two fatty acid molecules released from carbons 1 and 3 and a monoglyceride with a fatty acid esterified to glycerol at carbon 2 . Lipase binds to the oil/water interface of the triglyceride oil droplet, where it acts to hydrolyze the triglyceride. Both bile acids and colipase are important for the full activity of lipase. Bile acids aid in the emulsification of triglyceride to enlarge the surface area for lipase to act on, and they form micelles with fatty acids and monoglyceride, which, in turn, remove these products from the oil/water interface. Colipase is believed to form

a complex with lipase and bile salts. This ternary complex anchors lipase and allows it to act in a more hydrophilic environment on the hydrophobic surface of the oil droplet.

Proteases secreted by the pancreas are generally divided into two groups—the endopeptidases and the exopeptidases. All are stored and secreted from the pancreas as inactive proforms that are activated in the duodenum by trypsin. Trypsin, chymotrypsin and elastase are endopeptidases that cleave specific peptide bonds adjacent to specific amino acids within a protein. Exopeptidases include carboxypeptidases that cleave peptide bonds at the carboxyl terminus of proteins.

PATHOPHYSIOLOGY OF ACUTE PANCREATITIS

The pathophysiology of acute pancreatitis is characterized by a loss of intracellular and extracellular compartmentation, by an obstruction of pancreatic secretory transport and by an activation of pancreatic enzymes. In biliary acute pancreatitis, outflow obstruction with pancreatic duct hypertension and a toxic effect of bile salts contribute to disruption of pancreatic ductules, with subsequent loss of extracellular compartmentation. Alcohol induces functional alterations of plasma membranes, alters the balance between proteolytic enzymes and protease inhibitors, thus triggering enzyme activation, autodigestion and cell destruction. Once the disease has been initiated, the

appearance of interstitial edema and inflammatory infiltration are the basic features of acute pancreatitis. The accumulation of polymorphonuclear granulocytes in pancreatic and extrapancreatic tissue, and the release of leukocyte enzymes play an essential role in the further progression of the disease and in the development of systemic complications. Activation of different cascade systems by proteolytic activity, and consumption of alpha 2-macroglobulin further characterize the severe clinical course of illness.

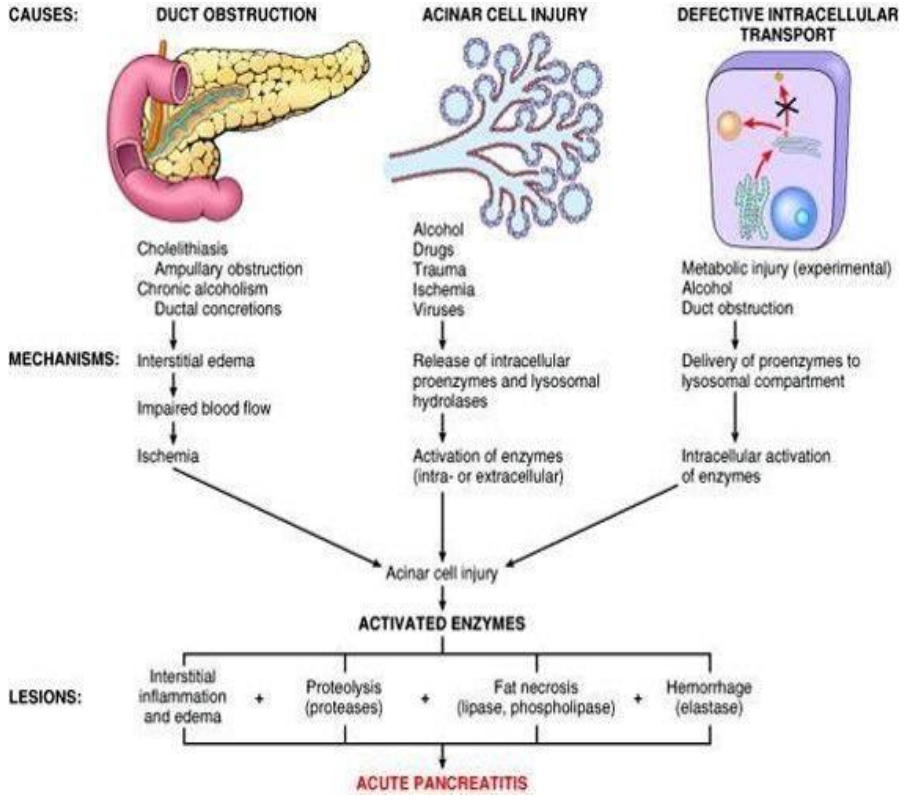

FIGURE 6 : PATHOPHYSIOLOGY OF ACUTE PANCREATITIS

AMERICAN COLLEGE OF GASTROENTEROLOGY GUIDELINES FOR MANAGING ACUTE PANCREATITIS

Acute pancreatitis (AP) is one of the most common diseases of the gastrointestinal tract, leading to tremendous emotional, physical, and financial human burden.

Two distinct phases of AP have now been identified:

(i) Early (within 1 week), characterized by the Systemic Inflammatory Response Syndrome (SIRS) and / or organ failure; and

(ii) Late (> 1 week), characterized by local complications.

It is critical to recognize the paramount importance of organ failure in determining disease severity.

Local complications are defined as peripancreatic fluid collections, pancreatic and peripancreatic necrosis (sterile or infected), pseudocysts, and walled-off necrosis

(sterile or infected). Isolated extrapancreatic necrosis is also included under the term necrotizing pancreatitis.

The guideline first discusses about the diagnosis, etiology, and severity of AP. Then focus is given on the early medical management of AP followed by a discussion of the management of complicated disease, most notably pancreatic necrosis.

The evolving issues of antibiotics, nutrition, and endoscopic, radiologic, surgical, and other minimally invasive interventions will be addressed.

DIAGNOSIS OF ACUTE PANCREATITIS

RECOMMENDATIONS

" 1. The diagnosis of AP is most often established by the presence of two of the three following criteria: (i) abdominal pain consistent with the disease,
(ii) serum amylase and / or lipase greater than three times the upper limit of normal, and / or
(iii) characteristic findings from abdominal imaging

2. Contrast-enhanced computed tomographic (CECT) and / or magnetic resonance imaging (MRI) of the pancreas should be reserved for patients in whom the diagnosis is unclear or who fail to improve clinically within the first 24-48 h after hospital admission

ETIOLOGY OF ACUTE PANCREATITIS

RECOMMENDATIONS

"1.Transabdominal ultrasound should be performed in all patients with AP
2. In the absence of gallstones and / or history of significant history of alcohol use, a serum triglyceride should be obtained and considered if > 1,000 mg / dl.

3. In a patient > 40 years old, a pancreatic tumor should be considered as a possible cause of AP.

4. Endoscopic investigation of an elusive etiology in patients with AP should be limited, as the risks and benefits of investigation in these patients are unclear.

5.Patients with idiopathic AP (IAP) should be referred to centers of expertise.

6. Genetic testing may be considered in young patients (< 30 years old) if no cause is evident and family history of pancreatic disease is present."

INITIAL ASSESSMENT AND RISK STRATIFICATION

RECOMMENDATIONS

"1. Hemodynamic status should be assessed immediately upon presentation and resuscitative measures begun as needed and then reassessed after 6 hrs, 12 hrs, 24 hrs. and 48 hrs.

2. Risk assessment should be performed to stratify patients into higher- and lower

risk categories to assist triage and the patients who fail to recover in 24 hours should be managed in ICU set up.

3. Patients with SIRS and organ failure should be transferred to an intensive care unit or intermediary care setting if they fail to improve in first 24 hours."

4. Uniformly, severity scoring systems are cumbersome, typically require 48 h to become accurate, and when the score demonstrates severe disease, the

patient’s condition is obvious regardless of the score. So,the initial management at the time of admission should start irrespective of any scoring modality.”

Clinical findings associated with a severe course for initial risk assessment

Patient characteristics

Age > 55 years

Obesity (BMI > 30 kg / m 2)

Altered mental status

Comorbid disease

The systemic infl ammatory response syndrome (SIRS)

Presence of > 2 of the following criteria:

– pulse > 90 beats / min

– respirations > 20 / min or PaCO 2 > 32 mm Hg

– temperature > 38 ° C or < 36 ° C

– WBC count > 12,000 or < 4,000 cells / mm 3 or > 10 % immature neutrophils (bands)

Laboratory findings

BUN > 20 mg/dl

Rising BUN

HCT > 44 %

Rising HCT

Elevated creatinine

Radiology findings

Pleural effusions

Pulmonary infiltrates

Multiple or extensive extrapancreatic collections

INITIAL MANAGEMENT

RECOMMENDATIONS

"1. Aggressive hydration, defined as 250 – 500 ml per hour of isotonic crystalloid solution should be provided to all patients, unless cardiovascular, renal, or other related comorbid factors exist. Early aggressive intravenous hydration is most beneficial during the first 12 – 24 h, and may have little benefit beyond this time period.

2. In a patient with severe volume depletion, manifest as hypotension and tachycardia, more rapid repletion (bolus) may be needed.

3. Lactated Ringer s solution may be the preferred isotonic crystalloid replacement fluid.

4. Fluid requirements should be reassessed at frequent intervals within 6 h of admission and for the next 24 – 48 h. The goal of aggressive hydration should be to decrease the BUN."

ROLE OF ERCP IN ACUTE PANCREATITIS

RECOMMENDATIONS

“1. Patients with AP and concurrent acute cholangitis should undergo ERCP within 24 h of admission.

2. ERCP is not needed early in most patients with gallstone pancreatitis who lack laboratory or clinical evidence of ongoing biliary obstruction.

3. In the absence of cholangitis and / or jaundice, MRCP or EUS rather than diagnostic ERCP should be used to screen for choledocholithiasis if highly suspected .

4. Pancreatic duct stents and / or postprocedure rectal nonsteroidal anti-inflammatory drug (NSAID) suppositories, e.g..Indomethacin should be utilized to lower the risk of severe post-ERCP pancreatitis in high-risk patients.”

THE ROLE OF ANTIBIOTICS IN AP

RECOMMENDATIONS

“1. Antibiotics should be given for an extrapancreatic infection, such as cholangitis, catheter-acquired infections, bacteremia, urinary tract infections, pneumonia.

2. Routine use of prophylactic antibiotics in patients with severe AP is not recommended.

3. The use of antibiotics in patients with sterile necrosis to prevent the development of infected necrosis is not recommended.

4. Infected necrosis should be considered in patients with pancreatic or extrapancreatic necrosis who deteriorate or fail to improve after 7 – 10 days of

hospitalization. In these patients, either (i) initial CT-guided fine-needle aspiration

(FNA) for Gram stain and culture to guide use of appropriate antibiotics or (ii) empiric use of antibiotics after obtaining necessary cultures for infectious agents, without CT FNA, should be given.

5. In patients with infected necrosis, antibiotics known to penetrate pancreatic necrosis, such as carbapenems, quinolones, and metronidazole, may be useful in delaying or sometimes totally avoiding intervention, thus decreasing morbidity and

mortality.

6. Routine administration of antifungal agents along with prophylactic or therapeutic antibiotics is not recommended."

NUTRITION IN AP

RECOMMENDATIONS

"1. In mild AP, oral feedings can be started immediately if there is no nausea and vomiting, and the abdominal pain has resolved.

2. In mild AP, initiation of feeding with a low-fat solid diet appears as safe as a clear liquid diet.

3. In severe AP, enteral nutrition is recommended to prevent infectious complications. Parenteral nutrition should be avoided, unless the enteral route is not available, not tolerated, or not meeting caloric requirements.

4. Nasogastric delivery and nasojejunal delivery of enteral feeding appear comparable in efficacy and safety."

THE ROLE OF SURGERY IN AP

RECOMMENDATIONS

"1. In patients with mild AP, found to have gallstones in the gallbladder, open / lap cholecystectomy should be performed before discharge to prevent a recurrence of AP.

2. In a patient with necrotizing biliary AP, in order to prevent infection, cholecystectomy is to be deferred until active inflammation subsides and fluid collections resolve or stabilize.

3. Asymptomatic pseudocysts and pancreatic and / or extrapancreatic necrosis do not warrant intervention regardless of size, location, and / or extension.

4. In stable patients with infected necrosis, surgical, radiologic, and / or endoscopic drainage should be delayed preferably for more than 4 weeks to allow liquefication of the contents and the development of a fibrous wall around the necrosis (walled-off necrosis)

5. In symptomatic patients with infected necrosis, minimally invasive methods of necrosectomy are preferred to open necrosectomy."

Based on the above mentioned guidelines, patients were treated in our unit and the results are documented in the upcoming pages. Most of the Indian studies says that the application of guidelines as such is not feasible in the Indian setup. But, this study which has been done in 50 patients over a period of 10 months shows that the guidelines can be applied as such in the Indian population and adherence of guidelines is must for optimum results.

Further studies are required to test the universality, validity and reliability of the guidelines in our healthcare set up.

ABSTRACT

AIM: To study the outcomes and efficacy of managing Acute pancreatitis based on Guidelines by American College of Gastroenterology.

STUDY DESIGN:

Prospective study

MATERIALS AND METHODS

50 patients who got admitted in our unit which characteristic abdominal pain of Acute Pancreatitis were included in the study over a period of 10 months. Confirmation done with Blood Investigations and Imaging studies. Aggressive fluid management along with analgesics were given and the symptomatic improvements(PR, RR, Temp., SpO2) and lab investigations (Hb, TC, PCV, S.amylase) monitored at the end of 6 hours, 12 hours, 24 hours and 48 hours. The etiology, duration of symptoms, co-morbidities were studied. The number of Patients with SIRS and organ failure recorded and their recovery from the illness monitored. Unnecessary use of Antibiotics avoided and given only to those patients who had Infected Pancreatic Necrosis. CECT Abdomen and Pelvis done only in those patients who failed to show signs of recovery at the end of 24 hours. The patients with SIRS and organ failure at the end of 24 hours monitored and managed in ICU setup. The duration of hospital stay recorded. All the patients were managed strictly following the guidelines given by

American College of Gastroenterology. Severity of Pancreatitis applied based on Revised Atlanta Classification(2013) at the end of 48 hours. Organ Failure calculated using Modified Marshall Scoring using ABG Analysis.

STATISTICAL ANALYSIS:

To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and repeated measures ANOVA for continuous variables. Repeated measures ANOVA showed statistically significant variance for Pulse Rate, Respiratory Rate, Temperature and Total Count at the time of admission, at 6^{th} hour, 12^{th} hour, 24^{th} hour and 48^{th} hour. The probability value 0.05 is considered as significant level.

RESULTS:

Out of the 50 patients admitted with Acute Pancreatitis, 32 patients were in SIRS and 4 patients were with Organ Failure. The patients were managed based on ACG Guidelines. At the end of 48 hours, 27/32 patients got completely recovered from SIRS and 3/ 4 patients completely recovered from organ failure. Only 11 patients required both USG and CECT Abdomen as they failed to show signs of recovery at the end of 24 hours. Antibiotics given only in 8 patients. Out of the 50 patients, 4 patients underwent Laparoscopic Cholecystectomy. 25 patients were diagnosed of mild pancreatitis, 24 as Moderately severe Acute Pancreatitis and 1 with severe pancreatitis. The duration of hospital stay varied

from 6-25 days. No deaths occurred during the period of study.

CONCLUSION:

Guidelines based management give optimum results in patients with Acute pancreatitis. Initial 24- 48 hours is the crucial period in the management of Acute pancreatitis. Failure of Aggressive fluid challenge in the patients will lead to irreversible necrotic changes in the Pancreas. Further studies are required to test the universality, validity of adopting the ACG Guidelines as such in our setup.

AIMS & OBJECTIVES:

-To study the mode of Presentation, Etiology, Course and Recovery from acute pancreatitis based on Guidelines suggested by American College of Gastroenterology.

-To focus on adopting a guidelines based approach towards the illness and reduce variation in practice.

MATERIALS AND METHODS

PLACE OF STUDY: Department of General Surgery, S6 unit, Govt. Stanley Medical College &Hospital, Chennai

DURATION:

10 months (NOV.2016 to SEPT. 2017)

STUDY DESIGN:

Prospective study

SAMPLE SIZE : 50 cases

INCLUSION CRITERIA :

All adult patients with clinical, Laboratory Investigations and Imaging studies showing features of Acute Pancreatitis.

Patients with first episode of Acute Pancreatitis.

EXCLUSION CRITERIA:

Patients with chronic Pancreatitis

Patients with acute on chronic pancreatitis

Patients with malignancy.

METHODOLOGY

- ✓ All newly diagnosed cases of Acute Pancreatitis as per the guidelines given by American College of Gastroenterology(ACG) were subjected to aggressive fluid management irrespective of the scoring at the time of admission because severity scoring systems typically require 48 hours to become accurate.

- ✓ Various factors associated with etiology, clinical signs, sensitivity as a diagnostic tool, treatment outcomes, complications., etc were assessed with the help of a well structured clinical proforma.

- ✓ Patients after institution of aggressive fluid management and analgesics were reassessed after 6 hours, 12hours, 24 hours and 48 hours to know the response to treatment based on symptomatic improvement and blood investigations as given in the proforma.

- ✓ CECT Abdomen and Pelvis will be taken only if there is no improvement after 24 hours with aggressive fluid management.

- ✓ Antibiotics are recommended only after 24 hours when the patient is deteriorating and imaging studies showing Acute Necrotizing Pancreatitis (Infected Necrosis).

- ✓ Antibiotic of Choice will be MEROPENEM / IMIPENEM depending on the availability. In case of inavailability of the drug, the patient will be put on CIPROFLOXACIN , 3rd choice of drug will be CEFTRIAXONE.

- ✓ The patient will be classified as Mild, Moderately Severe and Severe Pancreatitis after 48 hours of Admission based on Revised Atlanta Classification (2013)

CRITERIA FOR SIRS – More than two of the following (to be seen at the end of 6, 12, 24, 48 hours)

HR > 90 BEATS/MIN

TEMP < 36 DEGREE OR > 38 DEGREE

RR > 20/MIN or paCO2 > 32

WBC COUNT < 4000 cells/cumm or > 12000 cells /cu.mm

MODIFIED MARSHALL SCORE(more than 2 in any of the organs indicated organ failure) by ABG Analysis.

ORGAN SYSTEM	SCORE 0	1	2	3	4
paO2/FiO2	>400	301 - 400	201-300	101-200	<=101
Renal S.Creatinine	<1.4	1.4- 1.8	1.9 -3.5	3.6 -4.9	>4.9
Systolic BP	>90	<90, fluid responsive	<90, fluid unresponsive	<90, ph<7.3	<90, ph<7.2

FiO2

At room air	-	21	4 l/min nasal O2	-	30
2 l/min nasal O2	-	25	6-8 l/min nasal O2	-	40

- ✓ If the patient is not improving in 24 hours with persistant SIRS, patient will be shifted to an ICU setup and monitored.
- ✓ The following data will be recorded -

  -Recovery from SIRS

  -Patients requiring ICU Care

  -Patients with Biliary Pancreatitis

  -Patients requiring surgery

- ✓ Initiation of orals in case of recovery or time of Interventional Procedure in case of severe course of the disease will be instituted as per the ACG Guidelines.

SEVERITY OF PANCREATITIS

Based on Atlanta Revision Criteria (2013), Patient will be classified as follows -

MILD ACUTE PANCREATITIS

Absence of organ failure

Absence of Local Complications

(Peripancreatic fluid collections/ Pancreatic and Peripancreatic Necrosis (sterile or infected)/ Pseudocysts, and walled-off Necrosis (Sterile or Infected).

MODERATELY SEVERE ACUTE PANCREATITIS

Local complications AND/OR

Transient Organ failure (< 48 hours)

SEVERE ACUTE PANCREATITIS

Persistent organ failure > 48 hours

(Organ failure described by Modified Marshall Scoring)

DATA HANDLING AND STATISTICAL ANALYSIS

Data was collected by the principal investigator using pre-designed data collection sheets. Frequency tables and summary statistics were made for the socio-demographic characteristics and the various outcome variables in the study. Means, medians were calculated. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and repeated measures ANOVA for continuous variables. Repeated measures ANOVA showed statistically significant variance for Pulse Rate, Respiratory Rate, Temperature and Total Count at the time of admission, at 6^{th} hour, 12^{th} hour, 24^{th} hour and 48^{th} hour. The probability value 0.05 is considered as significant level.

ETHICAL CONSIDERATIONS

The study commenced upon approval by the Department of Surgery and Institutional Ethical Committee (IEC). Informed consent was obtained from each participant prior to enrolment in the study. A pre-consent counselling of the participants was done .The next of kin signed consent on behalf of participants who were unable to do so. Those who declined participation were not denied treatment they deserved because of their decision not to participate. There was no extra cost incurred for participating in the study.

RESULTS

A prospective study for ten months of all adult patients with clinical, laboratory Investigations and Imaging studies showing features of acute pancreatitis (first episode of acute pancreatitis as per the guidelines given by American College of Gastroenterologists) were subjected to aggressive fluid management irrespective of the scoring at the time of admission. Various factors associated with aetiology, clinical signs, sensitivity, treatment outcomes, complications, etc.were assessed and the Patients after institution of aggressive fluid management and analgesics were reassessed after 6 hours, 12hours, 24 hours and 48 hours to know the response to treatment based on symptomatic improvement and blood investigations. The analysis yields the following findings.

Age distribution of the sample

The following figure illustrates the age distribution of the participants with mean age of 33.14 (S.D=6.263).

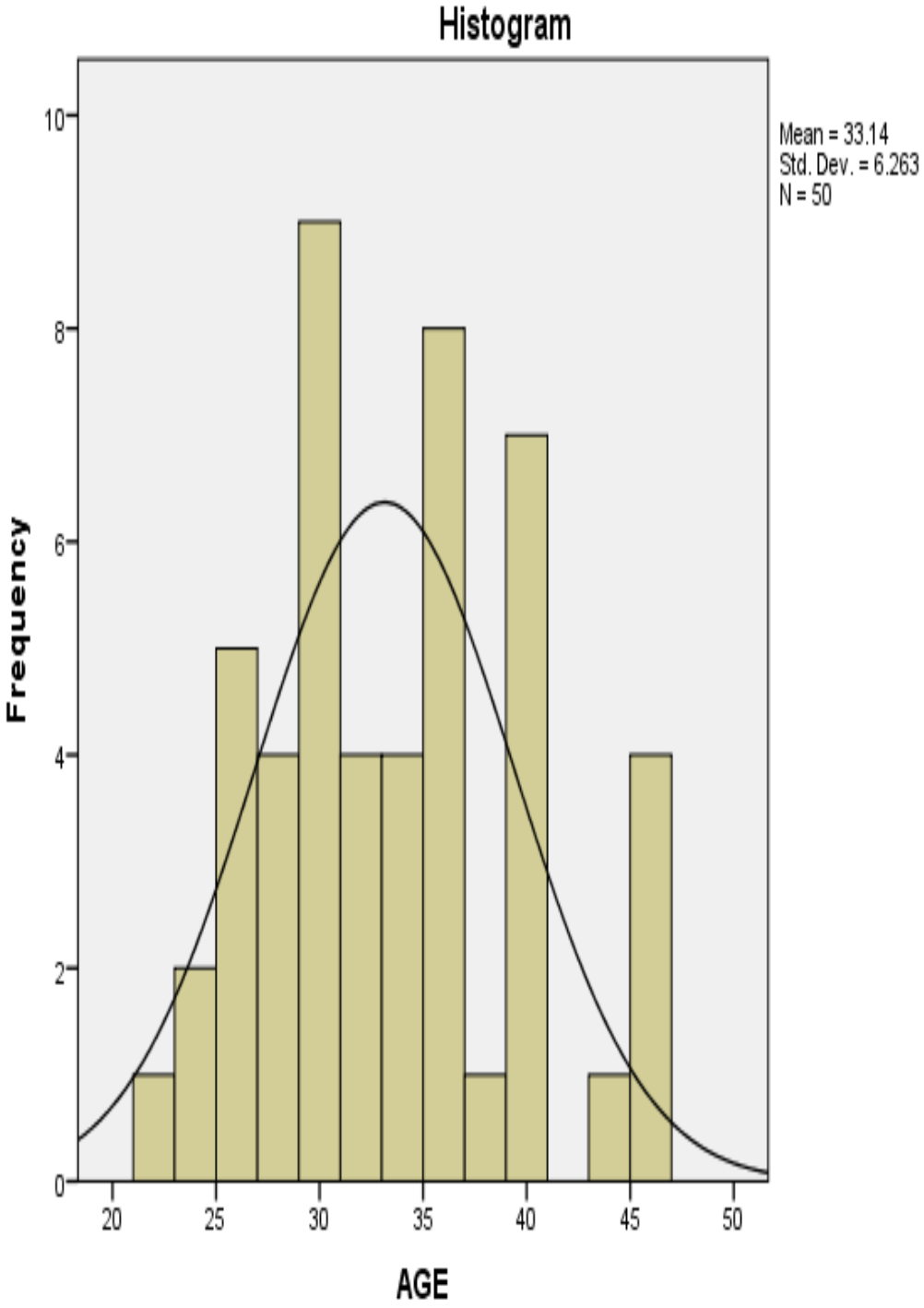

Chart 1 : Age distribution of the sample

Sex distribution of the sample

Majority of the patients were males (92%, n=46). The following figure illustrates this.

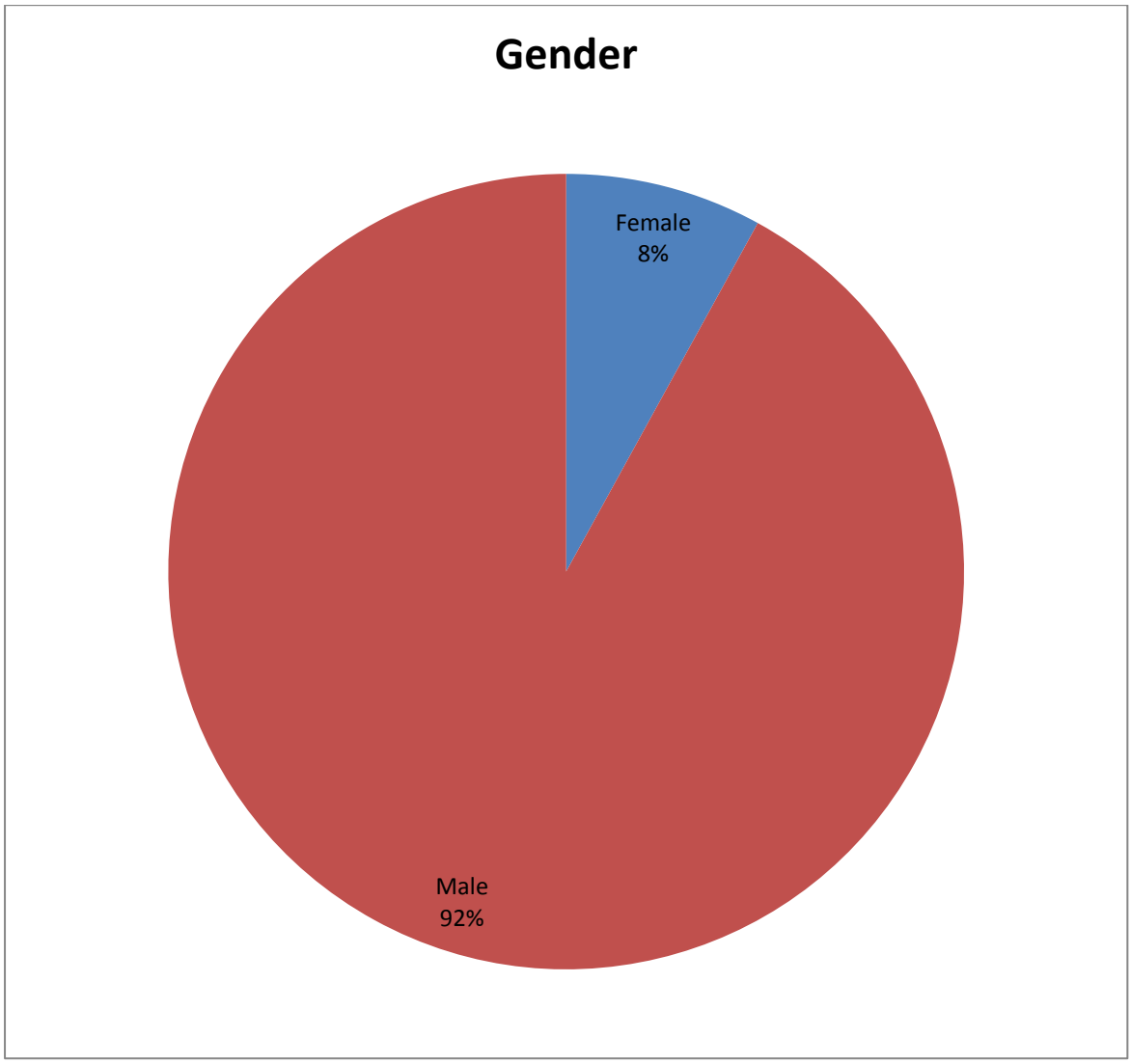

Chart 2: Gender distribution of the sample

Clinical Presentation of the illness

Majority of the patients reported epigastric guarding and tenderness (68%, n=34). The following picture depicts clinical presentation.

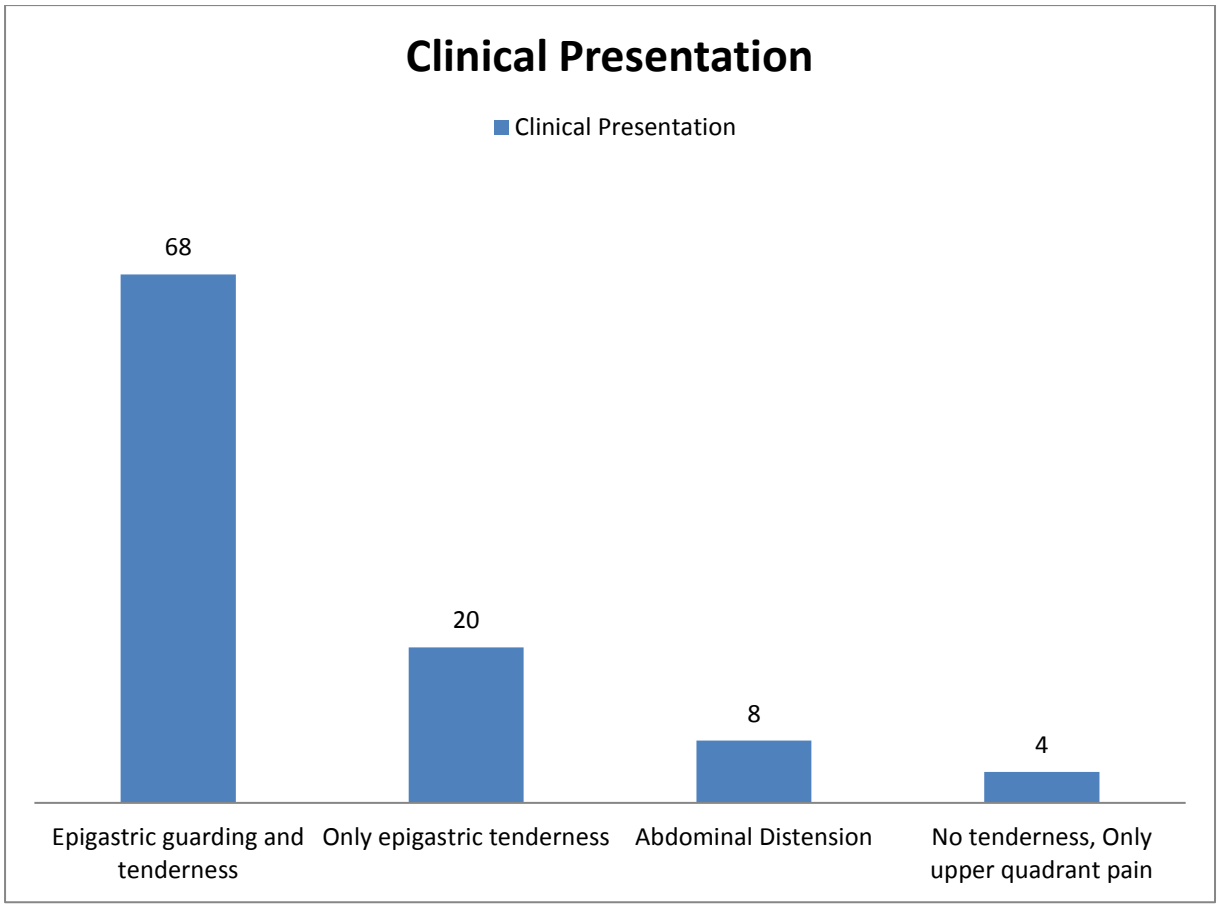

Chart 3: Clinical presentation of the sample

Duration of illness

The following image shows the duration of illness. Majority of them had two days of illness before seeking medical attention (38%, n=19).

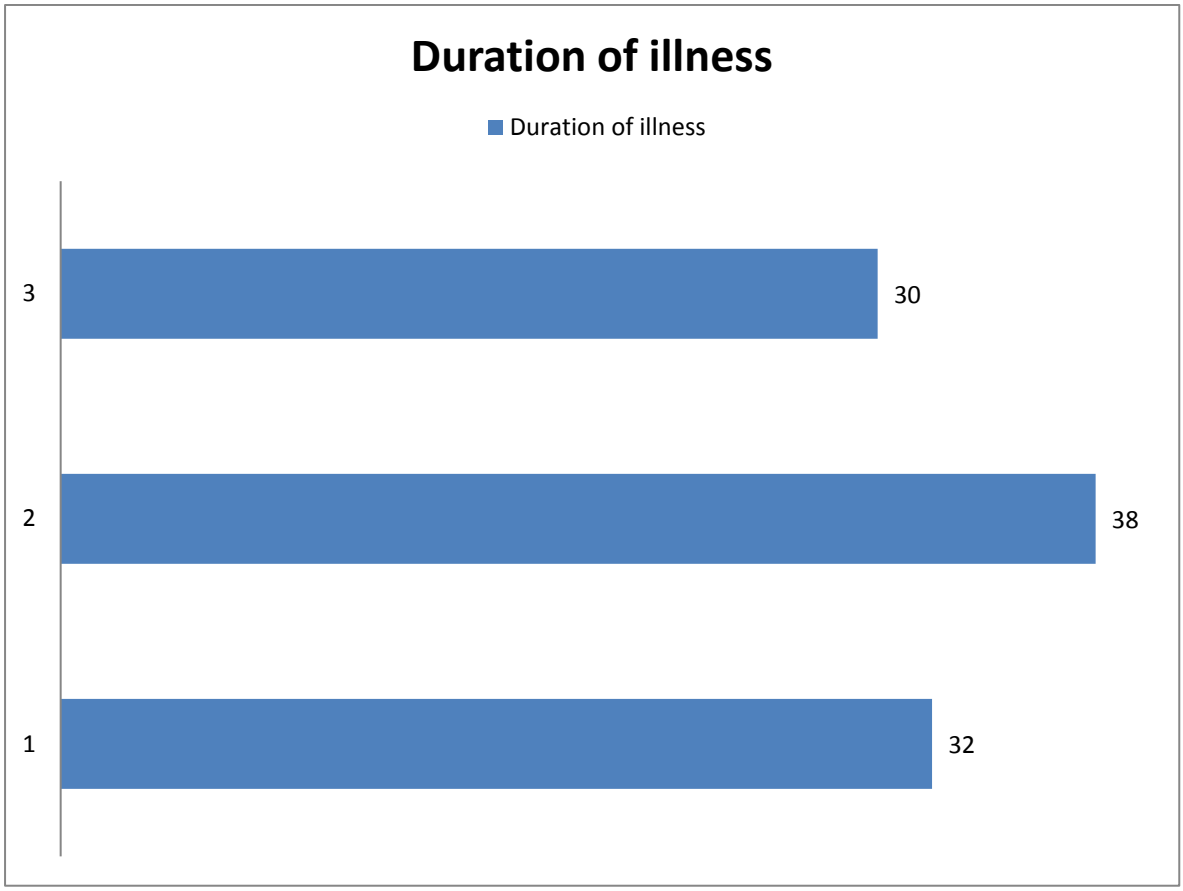

Chart 4: Duration of illness

Comorbid conditions

The following picture shows the comorbid conditions of the patients. Diabetic is the most common comorbid condition (12%, n=6).

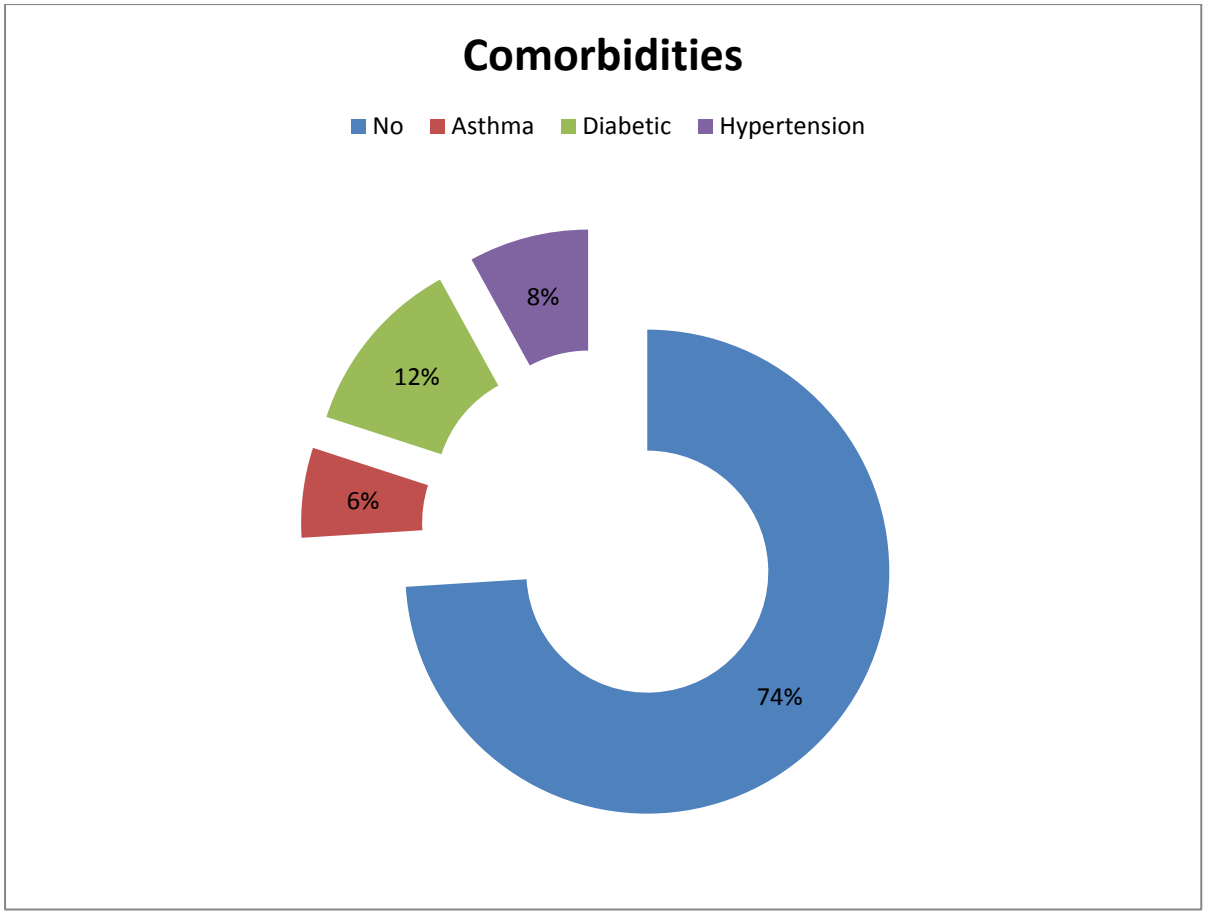

Chart 5: Comorbidities

Smoking and alcoholism

Out of 50 patients, 36 patients were smokers while 39 of them were alcoholics.

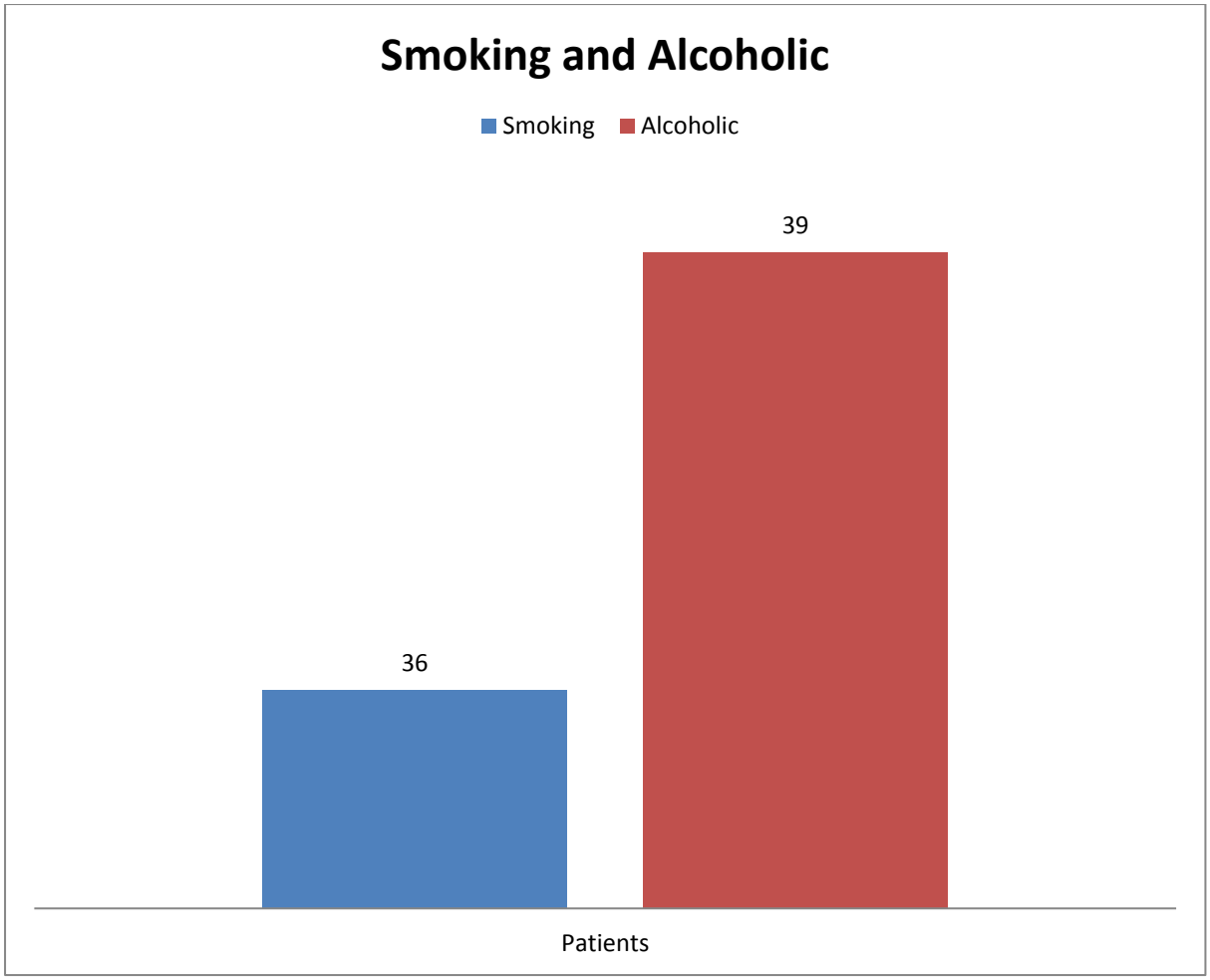

Chart 6*: Smoking and alcoholism of the sample*

Patients with SIRS (Systemic Inflammatory Response Syndrome)

The number of patients with SIRS was 32 in number. The following section illustrates the findings in the patients with SIRS. The following figure illustrates the age distribution with a mean of 33.72 (S.D=6.264, n=32).

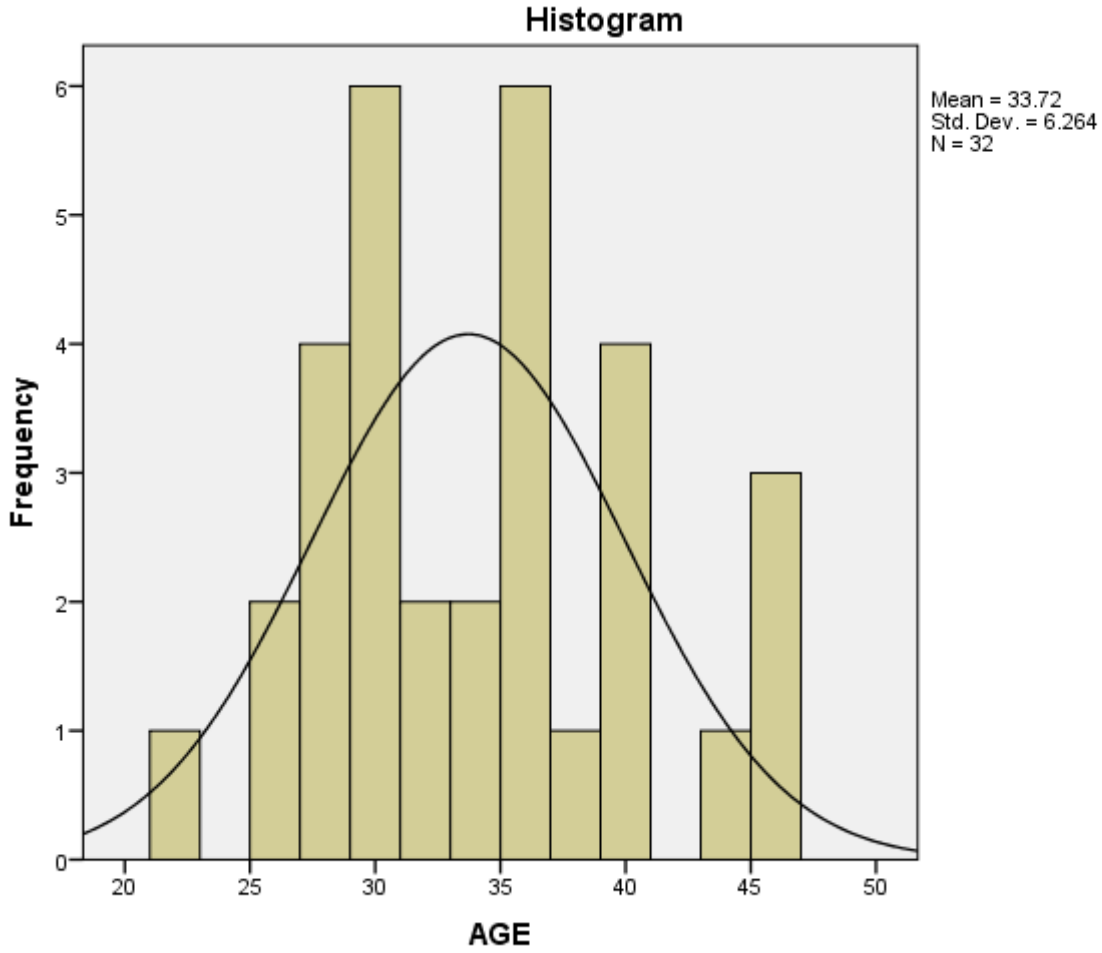

Chart 7: Age distribution of the patients with SIRS

Sex distribution of the sample

Majority of the patients were males (90.6%, n=29). The following figure illustrates this.

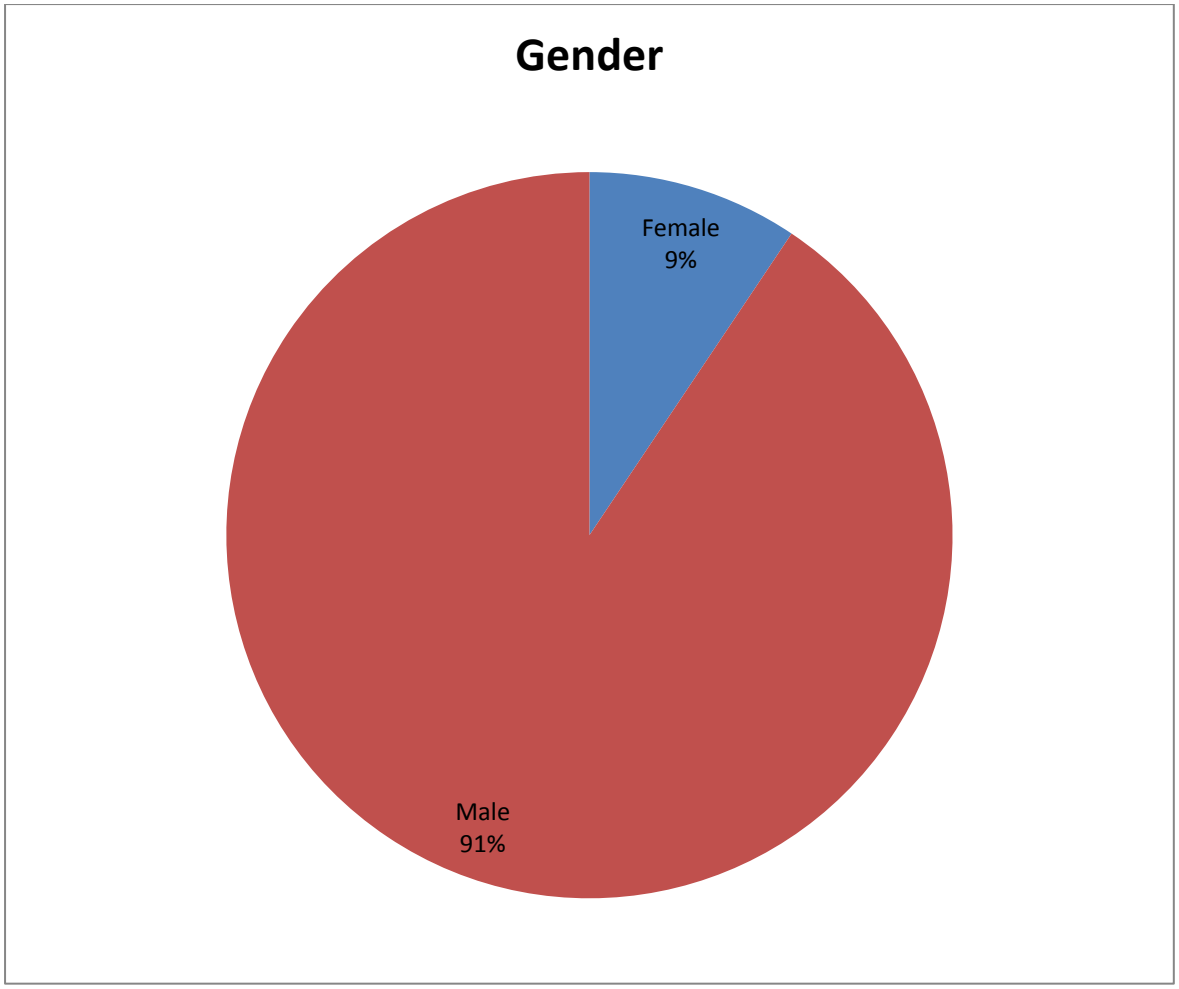

Chart 8: Gender distribution of the patients with SIRS

Clinical Presentation of the illness

Majority of the patients reported epigastric guarding and tenderness (78.1%, n=25). The following picture depicts clinical presentation.

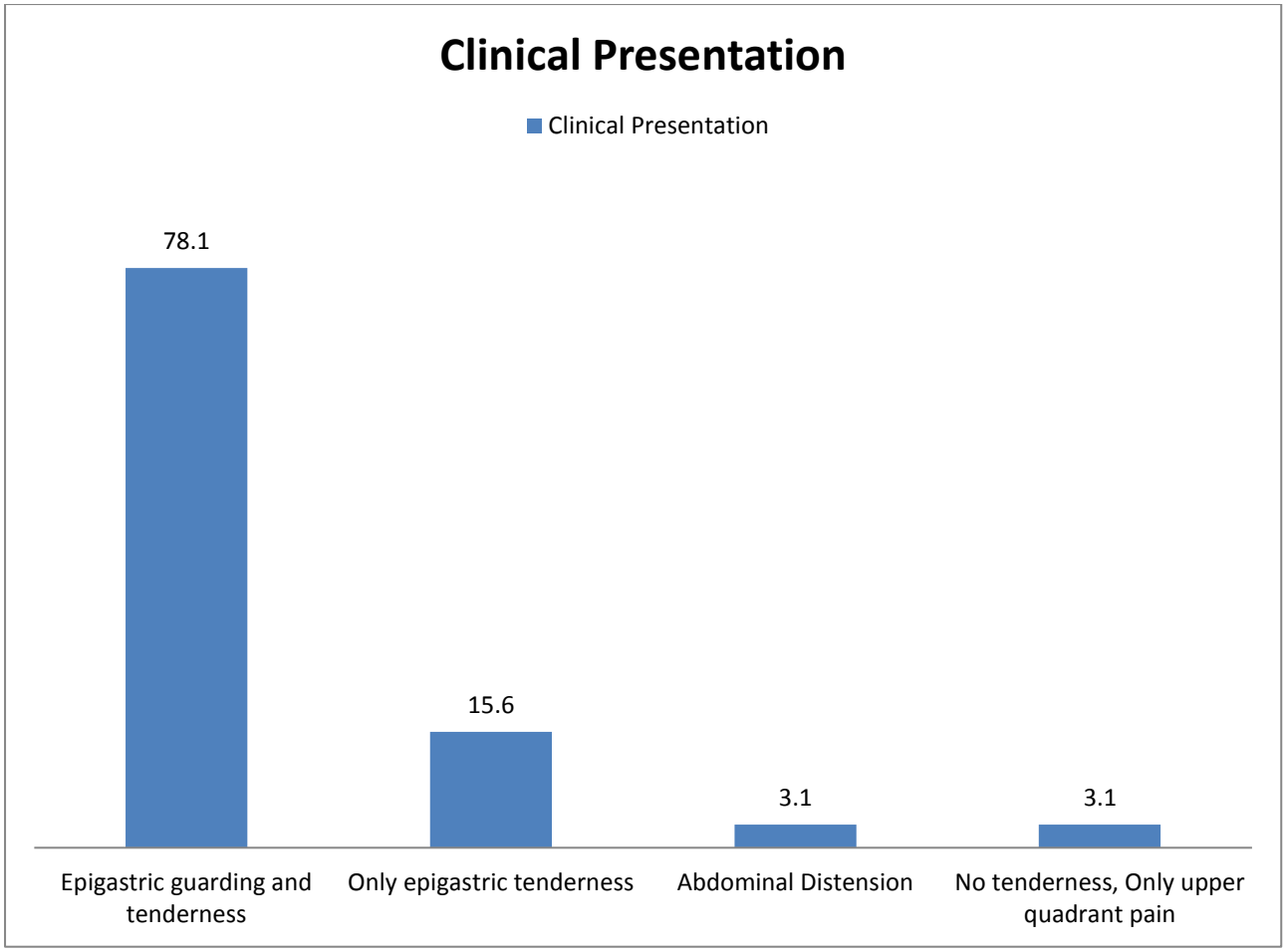

Chart 9: Clinical Presentation of the patients with SIRS

Duration of illness

The following image shows the duration of illness. Majority of them had two and three days of illness before seeking medical attention (34.4%, n=11).

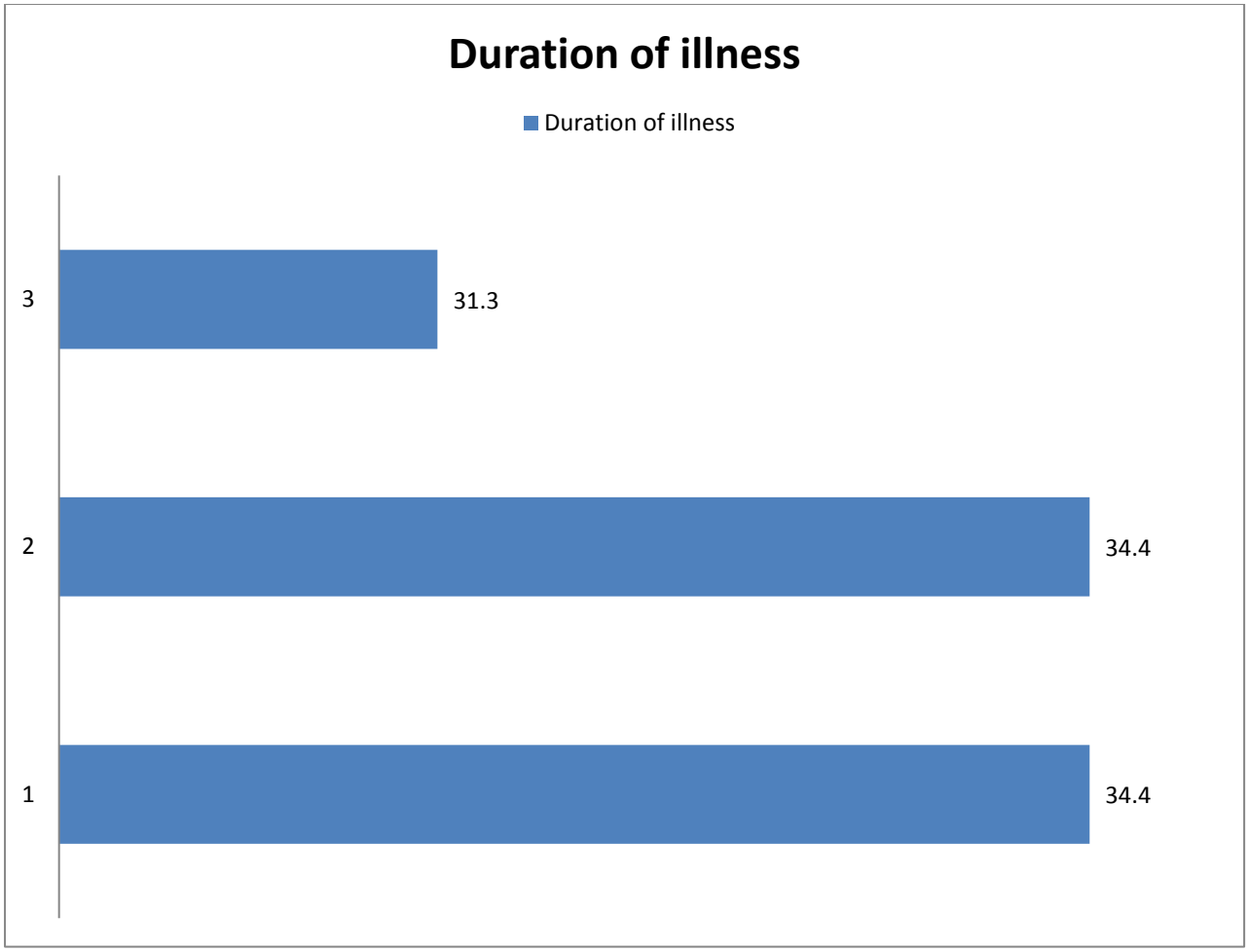

Chart 10: Duration of illness of the patients with SIRS

Comorbid conditions

The following picture shows the comorbid conditions of the patients. Diabetes and hypertension is the most common comorbid condition (12.5%, n=4).

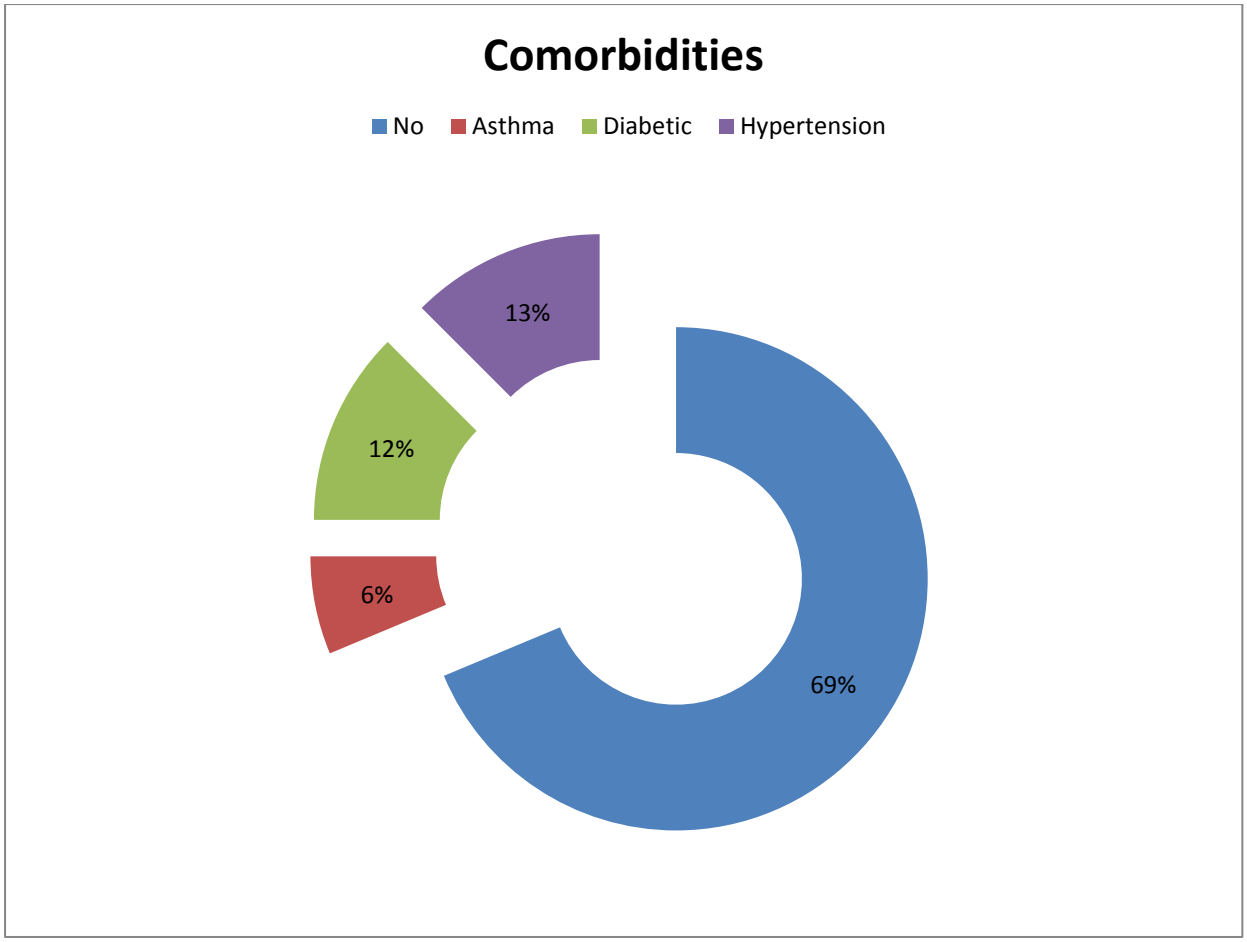

Chart 11: Comorbidities of the patients with SIRS

Smoking and alcoholism

Out of 32 patients, 24 (75%) patients were smokers and 24 (75%) of them were alcoholics.

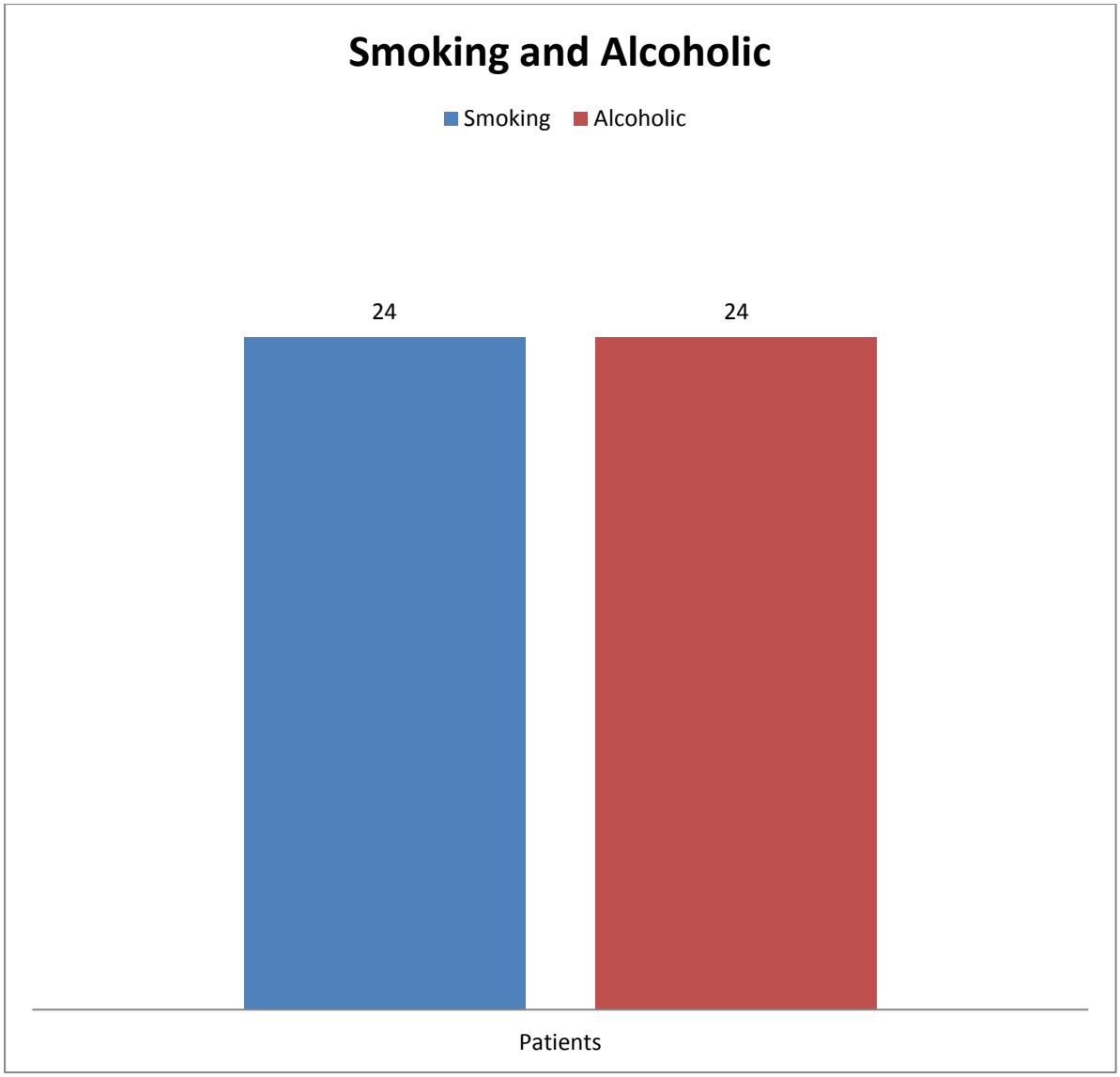

Chart 12: Smoking and alcoholism of the patients with SIRS

Patients with organ failure

There were four patients with organ failure in the age group of 26 to 29 with duration of illness 1 to 3 days, all of them were smokers and alcoholics but with no comorbid conditions. All of them had pleural effusion on chest x-ray while

USG abdomen and pelvis revealed peripancreatic fluid collection (n=2), bulky pancreas (n=1) and acute pancreatitis (n=1).

TREATMENT GIVEN TO THE PATIENTS

AT THE TIME OF ADMISSION

Two 18 G venflon- fluids initiated at 150 ml/ hr

Ryles tube insertion- for patients in SIRS

NPO – for all patients

Catheterise all patients

Inj. Pantoprazole 40 mg iv stat

Inj tramadol 100 mg im stat

AT THE END OF 6 HOURS

IVF- RL @ 250 ml/hr

Nasal O2 for patients with

- spo2 < 95%
- organ failure

Inj. Pantoprazole 40mg iv bd and Inj.Tramadol 2cc im bd given

URINE OUTPUT MONITORING

Blood investigations repeated.

Reassessments symptomatically and with blood investigations done at 12^{th} hr, 24^{th} hr. and after 48 hours as shown in the master chart.

Patients who failed to recover from SIRS and Organ failure were subjected to CECT Abdomen and ICU care was given.

Oral feeds started for patients who recovered at the end of 48 hours and patients with SIRS were started on NJ feeding. IV fluids reduced for those recovered from SIRS and the protocol based treatment continued.

Only 6 patients with fever and necrotizing pancreatitis were given Inj.Imepenem 1 g iv bd for 7 days.

Clinical parameters and Imaging

The following tables illustrate the clinical parameters at the time of admission, at 6th hour, 12th hour, 24th hour and 48th hour and their progression or recovery from disease.

Parameters	**At admission**	**6th hour**	**12th hour**
No. Of patients requiring nasal o2	32	30	20
Patients with SIRS	32	30	20
Recovery from SIRS	-	2	10
Biliary pancreatitis	4	4	4
Organ failure	4	4	4

Table 1: Clinical parameters and imaging at admission, 6th hour and 12th hour

Parameters	At 24 hours
No. Of patients requiring nasal o2	8
Patients with SIRS	8
Recovery from SIRS	24
Require ICU care	11
Biliary pancreatitis	4
Organ failure	3

Table 2: Clinical parameters and imaging at 24th hour

Parameters	At 24-48 hours
No. Of patients requiring nasal o2	3
Patients with SIRS	5
Recovery from SIRS	27
Biliary pancreatitis-resolved	4
Organ failure	1

Table 3: Clinical parameters and imaging at 24th– 48thhour

General Linear Model Repeated measures ANOVA

Repeated measures ANOVA shows statistically significant variance for Pulse Rate, Respiratory Rate, Temperature and Total Count at the time of admission, at 6th hour, 12th hour, 24th hour and 48th hour. The following figures represent their variance and the tables show the values statistically. Significance was fixed at $p<0.05$.

General Linear Model

Tests of Within-Subjects Effects

	Measure (Greenhouse-Geisser values)	Type III Sum of Squares	df	Mean Square	F	Sig.
	Pulse rate	2095.650	3.276	639.753	38.607	**.000**
	RR	11.475	1.371	8.368	2.468	**.001**
	SPO2	1.537	1.414	1.088	2.242	**.000**
	Temperature	2.368	1.506	1.573	.553	**.002**
	TC	2703125.000	1.545	1749537.277	.363	**.001**
	S.Amylase	1211736.100	1.000	1211736.100	38.785	**.000**

Table 4: Repeated measures ANOVA of variables of SIRS

The following figures illustrate the variance with time for the parameters of SIRS and other findings.

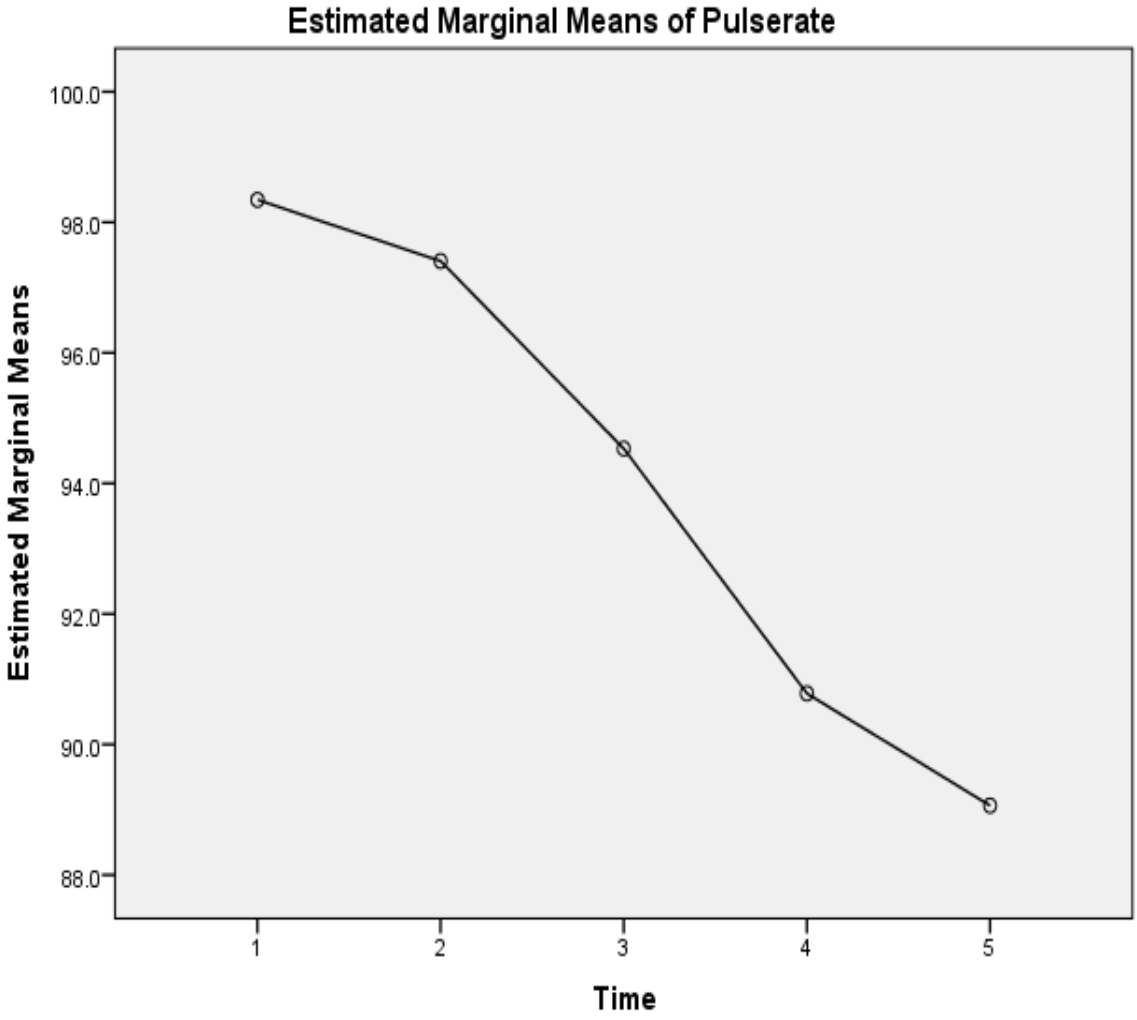

Chart 13*: Variance of pulse rate*

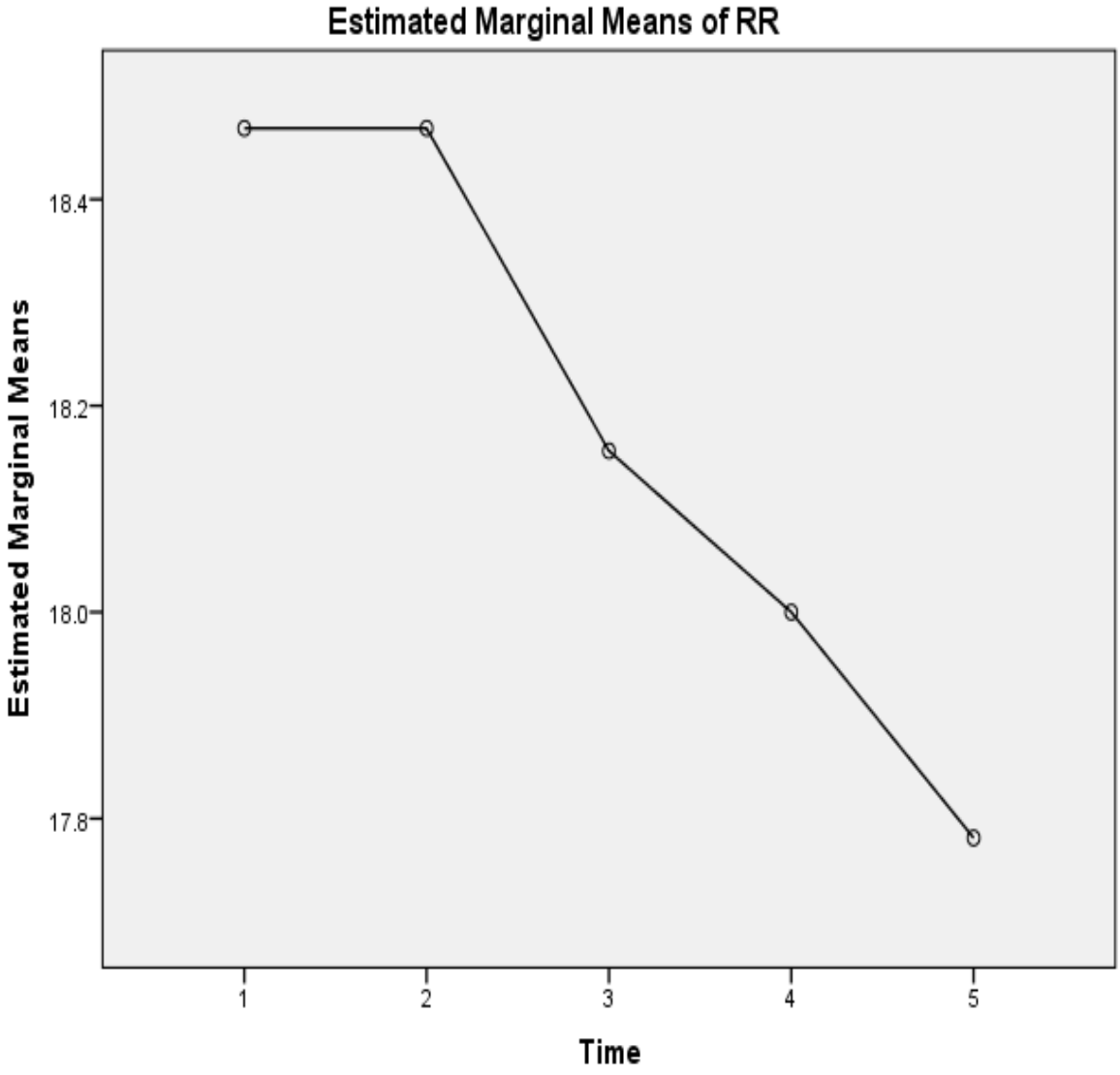

Chart 14: Variance of Respiratory rate

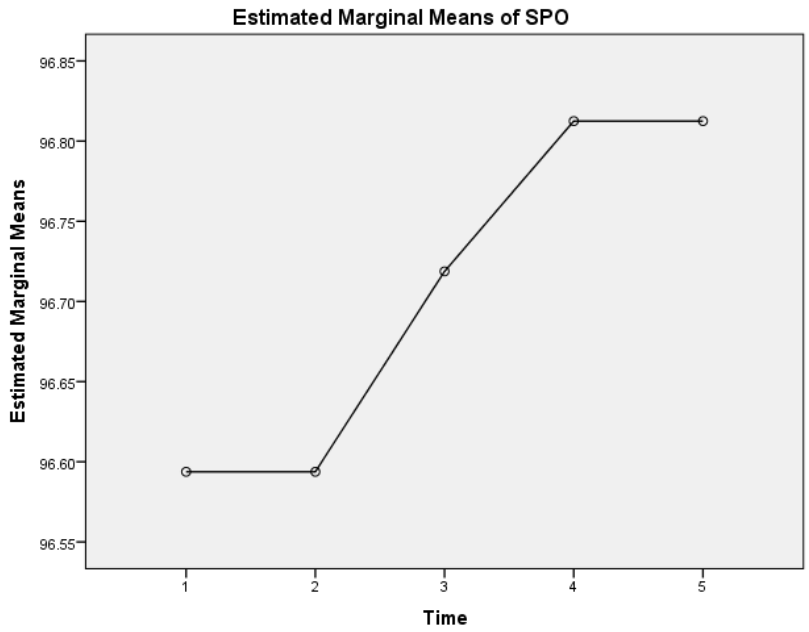

Chart 15: Variance of sp02

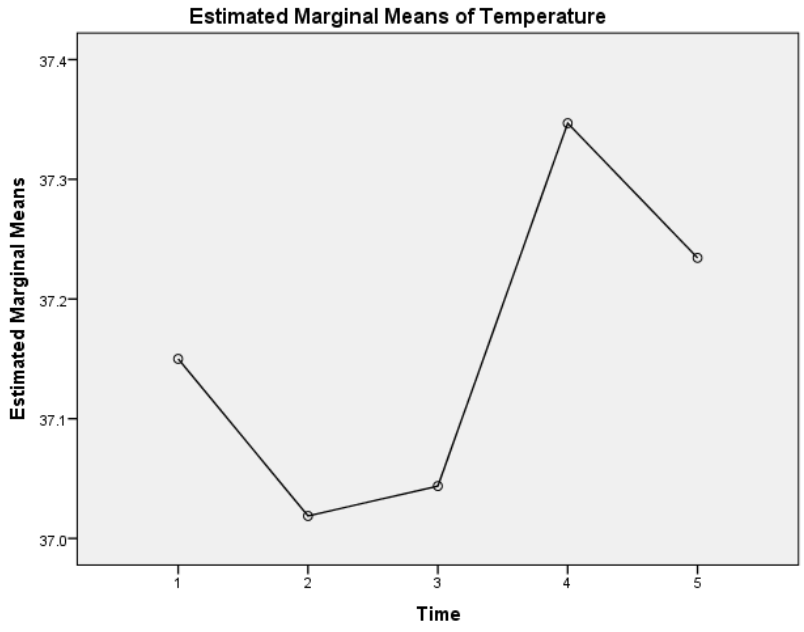

Chart 16: Variance of temperature

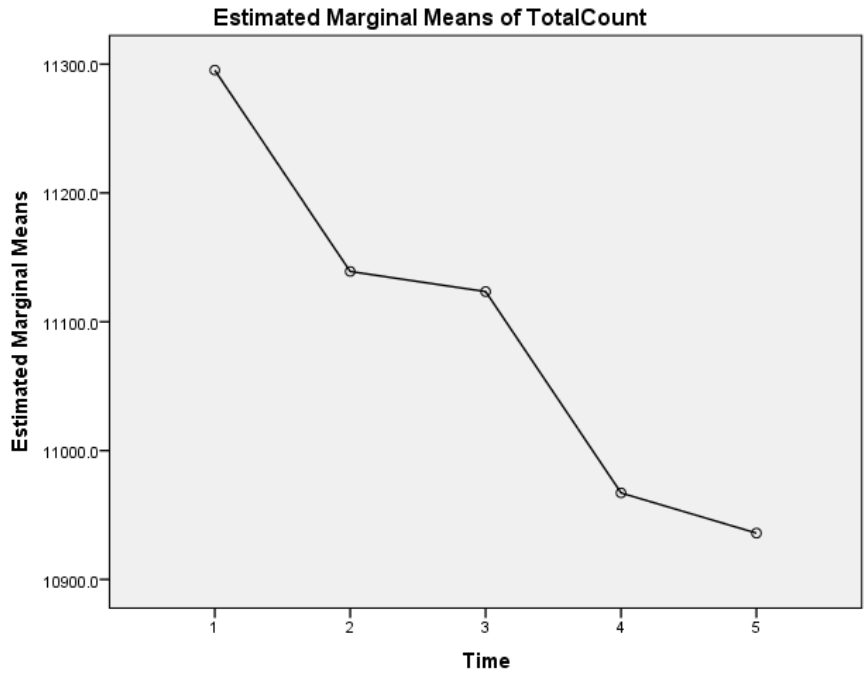

Chart 17: Variance of Total Count

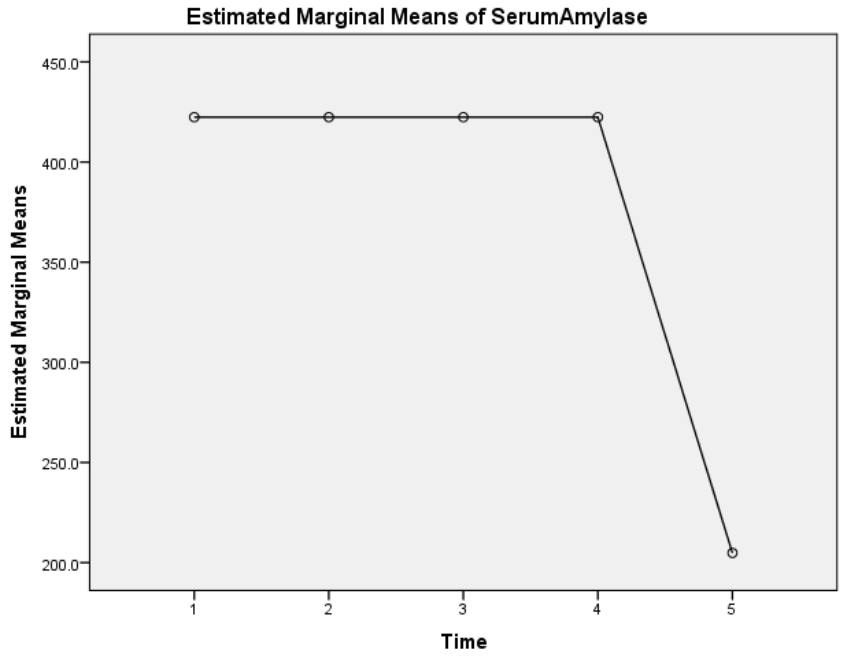

Chart 18: Variance of Serum Amylase

USG Abdomen and Pelvis

USG Abdomen and Pelvis	Frequency
Acute pancreatitis	13
Bulky pancreas	6
Bulky pancreas, GB Calculi +	1
Peripancreatic fluid collection	15
Peripancreatic fluid collection,GB Calculi +	1

Table 5: USG abdomen and Pelvis

X-ray abdomen erect and ECG

These tests did not reveal any significant results.

CT Abdomen and Pelvis at 24th hour

Eight patients (25%, N=32) with SIRS showed signs of acute necrotising pancreatitis while three patients with organ failure showed signs of acute necrotising pancreatitis.

Comparison between USG abdomen/pelvis and CT abdomen/pelvis

The following figure demonstrates the patients undergoing imaging. Only Eleven patients required both USG and CT.

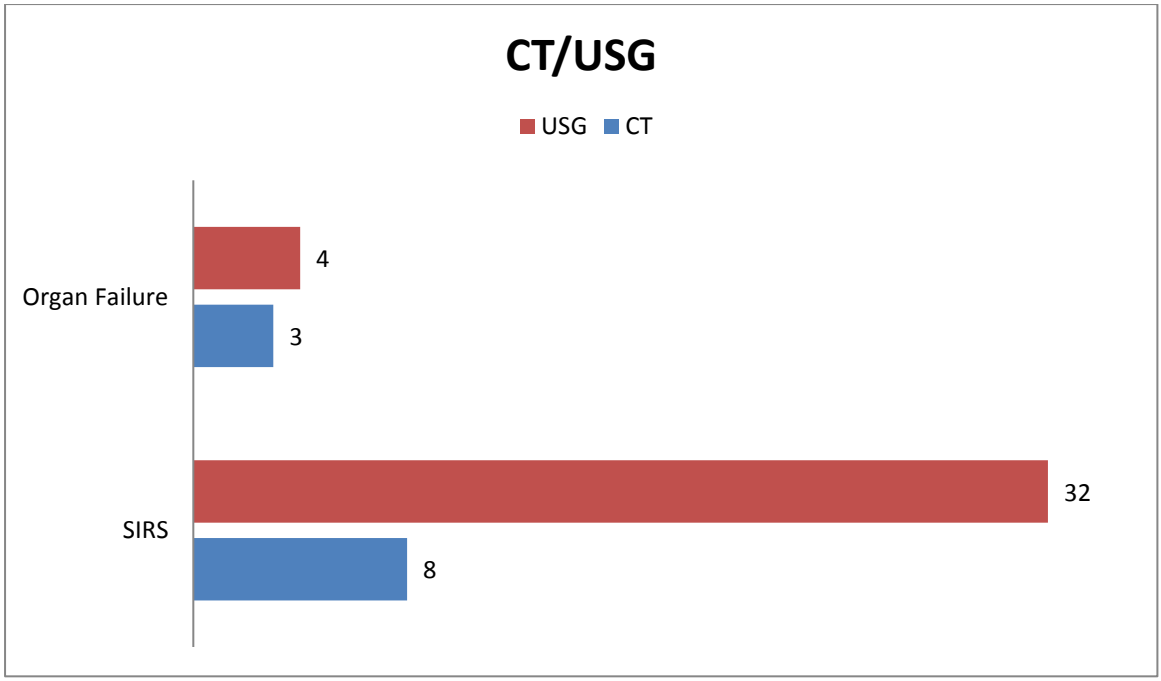

Chart 19: CT/USG

ICU transfer at 24th hour

Eight patients (25%, N=32) with SIRS and three patients with organ failure were transferred to ICU.

OGD Scopy

The following table illustrates the findings from OGD scopy.

OGD Scopy	Frequency
Normal	8
Duodenitis	13
Pangastritis	15

Table 6: OGD scopy

Severity of pancreatitis

Of the total patients presented, 25 patients had mild pancreatitis, 24 had moderately severe type and only 1 patient had Severe type of Acute Pancreatitis.

Surgery

Four patients out of 32 (9.4%) underwent laparoscopic cholecystectomy.

Duration of stay at the hospital

The following figure illustrates the duration of stay in the hospital for the patients with SIRS. The mean=8.72 days (S.D=4.595, N=32). For patients with organ failure, it varied between 6 to 25 days.

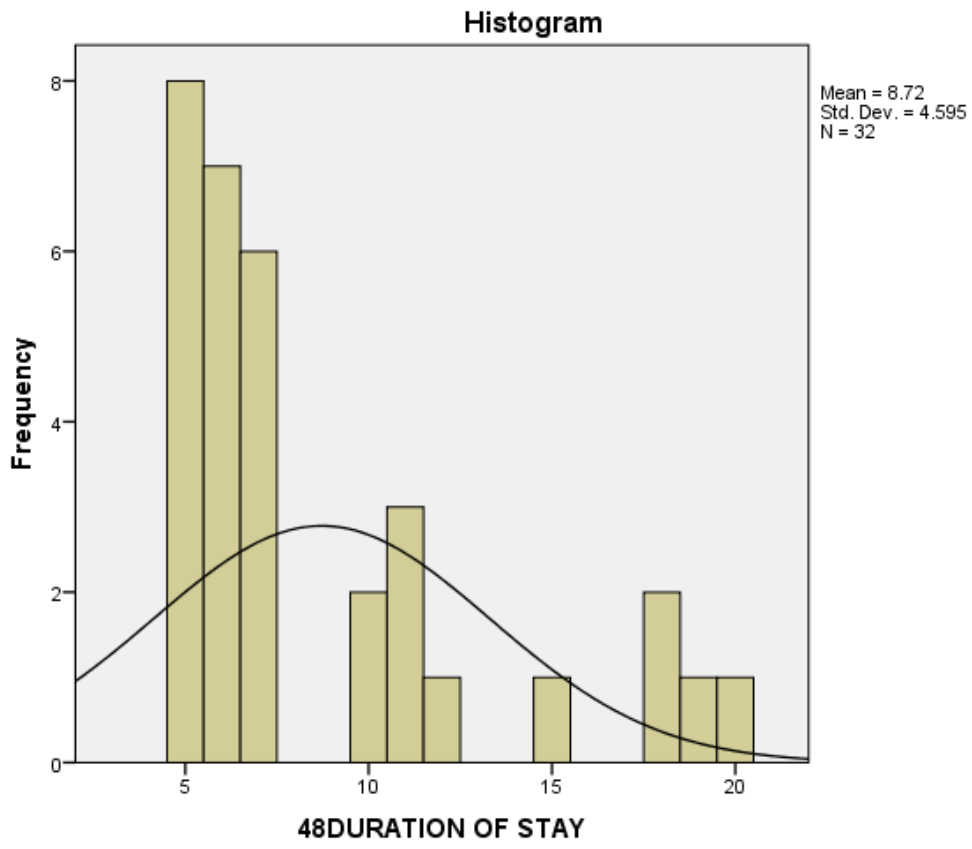

Chart 20: Duration of stay in hospital

DISCUSSION

A prospective study for ten months of all adult patients with clinical, laboratory Investigations and Imaging studies showing features of acute pancreatitis (first episode of acute pancreatitis as per the guidelines given by American College of Gastroenterologists) were subjected to aggressive fluid management irrespective of the scoring at the time of admission. Various factors associated with aetiology, clinical signs, sensitivity, treatment outcomes, complications, etc. were assessed and the Patients after institution of aggressive fluid management and analgesics were reassessed after 6 hours, 12hours, 24 hours and 48 hours to know the response to treatment based on symptomatic improvement and blood investigations. The age distribution of the participants was with mean age of 33.14 (S.D=6.263) while a majority of the patients were males (92%, n=46). Majority of the patients reported epigastric guarding and tenderness (68%, n=34) and most of them had two days of illness before seeking medical attention (38%, n=19). Diabetes was the most common comorbid condition (12%, n=6) and 36 patients were smokers while 39 of them were alcoholics.

The number of patients with SIRS was 32 in number a mean age distribution of 33.72 (S.D=6.264, n=32). Majority of the patients were males (90.6%, n=29). Majority of the patients reported epigastric guarding and tenderness (78.1%, n=25) and most of them had two and three days of illness before seeking medical attention (34.4%, n=11). Diabetes and hypertension is the most

common comorbid condition (12.5%, n=4). 24 (75%) patients were smokers and 24 (75%) of them were alcoholics. There were four patients with organ failure in the age group of 26 to 29 with duration of illness 1 to 3 days, all of them were smokers and alcoholics but with no comorbid conditions. All of them had pleural effusion on chest x-ray while USG abdomen and pelvis revealed peripancreatic fluid collection (n=2), bulky pancreas (n=1) and acute pancreatitis (n=1).

At 24^{th} hour, there were three people with biliary pancreatitis that was resolved with 48 hours whereas the number of organ failure patients came down from three to one between 24^{th} and 48^{th} hour. Three patients out of 32 (9.4%) underwent laparoscopic cholecystectomy.

Repeated measures ANOVA shows statistically significant variance for Pulse Rate, Respiratory Rate, Temperature and Total Count at the time of admission, at 6^{th} hour, 12^{th} hour, 24^{th} hour and 48^{th} hour.

Eight patients (25%, N=32) with SIRS showed signs of acute necrotising pancreatitis while three patients with organ failure showed signs of acute necrotising pancreatitis. Eleven patients required both USG and CT. Eight patients (25%, N=32) with SIRS and three patients with organ failure were transferred to ICU at 24^{th} hour.

All of them had moderately severe pancreatitis in SIRS while in organ failure two of them had moderately severe and one of them had severe and mild pancreatitis. The mean duration of stay in the hospital for the patients with SIRS was 8.72 days (S.D=4.595, N=32). For patients with organ failure, it varied between 6 to 25 days. There were 13 cases of duodenitis and 15 cases of pangastritis in OGD scopy.

All these findings correlate with the guidelines outlined by the American College of Gastroenterology which has thrown light upon the management of cases of acute pancreatitis. As given in the protocol, clinical symptoms were used to establish the diagnosis of the disease with other tests of radiology like CT was reserved for patients with no improvement or with unclear diagnosis. Patients with SIRS and Organ failure were transferred to the ICU with aggressive hydration.

At the end of 48 hours, of the 32 patients with SIRS and 4 patients with Organ Failure, 27 of patients with SIRS and 3 patients with organ failure recovered well. The remaining 5 patients with SIRS and 1 patient with organ failure recovered over the period of time slowly with hydration and analgesics. No deaths occurred in the study population proving that adherence to guidelines is must for optimum results.

STRENGTHS AND LIMITATIONS OF THE STUDY

The major strengths of the study are the following:

- This is a prospective study.
- The sample size is good for a study period of 10 months.
- The results were statistically analyzed and proven.

The main limitations are as mentioned below:

- The study can be extended for a longer period with a larger sample size for better results.
- There are many studies based on the ACG Guidelines, but with changes made in it for managing the patients.No study has been conducted with the adherence of Guidelines. Even though this study has been done without deviating from the guidelines, further studies are required to test the universality, validity and reliability of the guidelines in different healthcare set up.
- There are no literature reviews as such which has shown the adherence to the guidelines.

CONCLUSION

- The present study emphasizes the management of acute pancreatitis according to the guidelines given by American College of Gastroenterology. Clinical symptoms and Blood investigations are used to establish the diagnosis of the disease along with radiological imaging like Ultrasonography. Other tests like CECT Abdomen and Pelvis are reserved for patients with no improvement or with unclear diagnosis after 24 hours. Patients with SIRS and Organ failure should be transferred to the ICU with aggressive hydration if there are no signs of improvement after 24 hours of aggressive fluid management and analgesics. Laparoscopic cholecystectomy should be done in patients with biliary pancreatitis after complete recovery before discharge.
- Antibiotics should given only in those patients who are having Infected pancreatic necrosis established clinically and confirmed by Contrast Enhanced CT. No patients in our study population presented with Acute Cholangitis and hence ERCP was not done in any.
- With aggressive management, the clinical parameters denoting SIRS and organ failure improved.

- With the adherence of guidelines, there was no mortality of Acute pancreatitis and also the duration of stay in hospital decreased. But still, further studies are required to test the universality, validity in our setup.

LIST OF ABBREVIATIONS

AP – Acute Pancreatitis

$NaHCO_3$ – Sodium Bicarbonate

PaSC – Pancreatic Stellate Cell

PSTI – Pancreatic Secretory Trypsin Inhibitor

CECT – Contrast Enhanced Computed Tomography

MRI – Magnetic Resonance Imaging

IAP – Idiopathic Acute Pancreatitis

BMI – Body Mass Index

ABG – Arterial Blood Gas Analysis

PR – Pulse Rate

RR – Respiratory Rate

ACG – American College of Gastroenterology

BUN – Blood Urea Nitrogen

HCT – Hematocrit

WBC – White Blood Cells

ERCP – Endoscopic Retrograde Cholangio-Pancreatography

MRCP – Magnetic Resonance Cholangio-Pancreatography

NSAID – Non-Steroidal Anti Inflammatory Drug

EUS – Endoscopic Ultrasound

FNA – Fine Needle Aspiration

Temp – Temperature

FiO2 – Fraction of Inspired Oxygen

SIRS – Systemic Inflammatory Response Syndrome

SD – Standard Devation

NPO – Nil Per Oral

ANOVA – Analysis of Variance

RL – Ringer Lactate

NJ – Naso Jejunal

ECG – Electrocardiography

OGD – Oesophagoduodenoscopy

USG – Ultrasonography

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BIBLIOGRAPHY

1) American College of Gastroenterology Guideline: Management of Acute Pancreatitis
Scott Tenner , MD, MPH, FACG1 , John Baillie , MB, ChB, FRCP, FACG 2 , John DeWitt , MD, FACG3 and Santhi Swaroop Vege , MD, FACG4

2) Gorelick F, Pandol, SJ, Topazian M. *Pancreatic physiology, pathophysiology, acute and chronic pancreatitis*. Gastrointestinal Teaching Project, American Gastroenterologic Association. 2003.

3**)** Lessons learnt in management of Acute Pancreatitis by Deshpande Aparna Department of Surgery, Seth GS Medical College & KEM Hospital, Parel, Mumbai 400012, India

4**)** The role of the intestine in the pathophysiology and management of severe acute pancreatitis by RS Flint and JA Winds

5) Current concepts in the management of acute pancreatitis
Gautham Srinivasan,[1] L. Venkatakrishnan,[2] Swaminathan Sambandam,[1] Gursharan Singh,[1] Maninder Kaur,[3] Krishnaveni Janarthan,[2] and B. Joseph John[1]

6) Johnson CD, Abu-Hilal M. Persistent organ failure during the first week as a marker of fatal outcome in acute pancreatitis. Gut. 2004;53:1340–4. [PMC free article] [PubMed]

7) Koh YY, Jeon WK, Cho YK, Kim HJ, Chung WG, Chon CU, et al. The effect of intestinal permeability and endotoxemia on the prognosis of acute pancreatitis. Gut Liver. 2012;6:505–11. [PMC free article] [PubMed]

8) Warndorf MG, Kurtzman JT, Bartel MJ, Cox M, Mackenzie T, Robinson S, et al. Early fluid resuscitation reduces morbidity among patients with acute pancreatitis. Clin Gastroenterol Hepatol. 2011;9:705–9. [PMC free article] [PubMed]

9) Gardner TB, Vege SS, Chari ST, Petersen BT, Topazian MD, Clain JE, et al. Faster rate of initial fluid resuscitation in severe acute pancreatitis diminishes in-hospital mortality. Pancreatology. 2009;9:770–6. [PubMed]

10). Eckerwall G, Olin H, Andersson B, Andersson R. Fluid resuscitation and nutritional support during severe acute pancreatitis in the past: What have we learned and how can we do better? Clin Nutr. 2006;25:497–504. [PubMed]

11) Golub R, Siddiqi F, Pohl D. Role of antibiotics in acute pancreatitis: a meta-analysis. Gastrointest Surg. 1998;2:496–503. [PubMed]

12) Sharma VK, Howden CW. Prophylactic antibiotic administration reduces sepsis and mortality in acute necrotizing pancreatitis: a meta-analysis. Pancreas. 2001;22:28–31. [PubMed]

13) Bassi C, Falconi M, Talamini G, et al. Controlled clinical trial of perfloxacin versus imipenem in severe acute pancreatitis. Gastroenterology. 1998;115:1513–17. [PubMed]

14) Nordback I, Sand J, Saaristo R, Paajanen H. Early treatment with antibiotics reduces the need for surgery in acute necrotizing pancreatitis – a single-center randomised study. J Gastrointest Surg. 2001;5:113–20. [PubMed]

15) Baron T, Morgan D. Acute necrotizing pancreatitis. N Engl JMed. 1999;340:1412–17. [PubMed]

16) Gloor B, Muller CA, Worni M, et al. Pancreatic infection in severe pancreatitis: the role of fungus and multi-resistant organisms. Arch Surg. 2001;136:592–6. [PubMed]

18) Norman J. The role of cytokines in the pathogenesis of acute pancreatitis. Am J Surg. 1998;175:76–83. [PubMed]

19) Marik PE. What is the best way to feed patients with pancreatitis? CurrOpinCrit Care 2009; 15: 131-138. [PMID: 19300086]

20) Ol?h A, Romics L Jr. Enteral nutrition in acute pancreatitis: a review of the current evidence. World J Gastroenterol 2014;20:16123-31. [PMID: 25473164]

21) Vries PW, van de Linde P, Slotema ET, Warmerdam PE, Breslau PJ. Computed tomography severity index is an early prognostic tool for acute pancreatitis. J Am CollSurg 2005;201:497-502. [PMID: 16183486]

22) Kusterer K, Poschmann T, Friedemann A, Enghofer M, Zendler S, UsadelKH. Arterial constriction, ischemia-reperfusion, and leucocyte adherence in acute pancreatitis. Am J Physiol1993;265:165-71. [PMID: 8338166]
23) Takeda K, Mikami Y, Fukuyama S, et al. Pancreatic ischemia associated with vasospasm in the early phase of human necrotizing pancreatitis. Pancreas 2005;30:40-9. [PMID: 15632698]

24) Tsuji Y, Takahashi N, Tsutomu C. Pancreatic Perfusion CT in Early Stage of Severe Acute Pancreatitis.Int J Inflam 2012;2012:497386. [PMID: 22518337]

25)Fisher JM, Gardner TB. The "golden hours" of management in acute pancreatitis. Am J Gastroenterol 2012;107:1146-50. [PMID: 22858994]

26) Brown A, Baillargeon JD, Hughes MD, Banks PA. Can fluid resuscitation prevent pancreatic necrosis in severe acute pancreatitis? Pancreatology 2002;2:104-7. [PMID: 12123089]

27) Grendell JH. Persisting early hypotension: is this why necrosis gets infected in acute pancreatitis?Dig Dis Sci 2015;60:285-7. [PMID: 25371152]

28)Anatomy of Exocrine Pancreas – ncbi bookshelf.

GOVT.STANLEY MEDICAL COLLEGE, CHENNAI- 600 001

INFORMED CONSENT

DISSERTATION TOPIC: "A STUDY ON OUTCOMES AND EFFICACY OF MANAGING ACUTE PANCREATITIS BASED ON GUIDELINES GIVEN BY AMERICAN COLLEGE OF GASTROENTROLOGISTS"

PLACE OF STUDY: GOVT. STANLEY MEDICAL COLLEGE, CHENNAI

NAME AND ADDRESS OF PATIENT:

I, _____ have been informed about the details of the study in my own language.
I have completely understood the details of the study.
I am aware of the possible risks and benefits, while taking part in the study.
I understand that I can withdraw from the study at any point of time and even then, I will continue to receive the medical treatment as usual.
I understand that I will not get any payment for taking part in this study.
I will not object if the results of this study are getting published in any medical journal, provided my personal identity is not revealed.
I know what I am supposed to do by taking part in this study and I assure that I would extend my full co-operation for this study.
Name and Address of the Volunteer:

Signature/Thumb impression of the Volunteer

Date:

Witnesses:
(Signature, Name & Address)
Date:

Name and signature of investigator:

சுயஒப்புதல்படிவம்

அரசுஸ்டான்லிமருத்துவகல்லூரி

சென்னை – 1

ஆராய்ச்சியின்பெயர் :

ஆய்வு இடம் : அரசுஸ்டான்லிமருத்துவகல்லூரி

_____ என்கிற எனக்கு

இந்த ஆராய்ச்சி பற்றிய முழு விவரங்களும் என் தாய்மொழியில் தரப்பட்டன.

இந்த ஆராய்ச்சி பற்றி முழுமையாக புரிந்து கொண்டேன்.

இதில் நான் பங்கு பெறுவதினால் ஏற்படக்கூடிய அசௌகரியங்கள் மற்றும் நன்மைகள் பற்றியும் தெரிந்து கொண்டேன்.

இந்த ஆராய்ச்சியிலிருந்து என் சுய விருப்பபடி ,எந்த நேரமும் விலகி கொள்ள முடியும் என்றும், அதனால் இம்மருத்துவமனையில் எனக்கு கிடைக்க வேண்டிய மருத்துவ உதவிகள் அனைத்தும் எந்த பாரபட்சமும் இல்லாமல் தொடர்ந்து கிடைக்கும் என்றும் தெரிந்து கொண்டேன்.

இதில் பங்கு பெற எந்தவித சன்மானமும் தர பட மாட்டாது என்று புரிந்து கொண்டேன் .

இந்த ஆராய்ச்சியின் முடிவுகள் , என்னை பற்றிய தனிப்பட்ட தகவல் ஏதும் தராமல் இருந்தால், மருத்துவம் சார்ந்த பத்திரிக்கைகளில் பிரசுரமாவதற்கு எதிர்ப்பு தெரிவிக்க மாட்டேன்.

இந்த ஆராய்ச்சியில் பங்கு பெற நான் என்ன செய்ய வேண்டும் என்று தெரிந்து கொண்டேன் . அதன்படி முழு ஒத்துழைப்பு கொடுக்க தயாராக உள்ளேன்.

பங்கு பெறுபவரின் கையொப்பம்_____

தேதி_____

முகவரி_____

சாட்சியாளரின் கையொப்பம்_____

தேதி_____

முகவரி_____

ஆராய்ச்சியாளரின் கையொப்பம்_____

தேதி_____

“A STUDY ON THE OUTCOME AND EFFICACY OF MANAGING ACUTE PANCREATITIS BASED ON GUIDELINES GIVEN BY AMERICAN COLLEGE OF GASTROENTROLOGISTS

Investigator: Dr.VAISHNAVI R.M., PG 2nd year – MS (General Surgery)

Guide: Prof. Dr. LALITHKUMAR, Chief, Unit S6

PATIENT INFORMATION MODULE

You are being invited to be a subject in this study.

Before you participate in this study, I am giving you the following details about this trial,

All patients diagnosed with acute upper abdominal pain radiating to back with USG showing features of Acute Pancreatitis will be included in this study. A detailed clinical history will be taken following a standardized proforma. A detailed clinical examination will be made and relevant basic investigations will be done at the time of admission. In case of being diagnosed as Acute Pancreatitis you will be treated accordingly , following a standardised management protocol which will be evaluated by this study . The results arising from this study will be analyzed and used for academic purposes. You will be given clear instructions at every step and you are free to ask/ clarify any doubts. Your identity will remain confidential. You are free to withdraw from this trial at any point of time, without any prior notice &/ or without any medical or legal implications.

I request you to volunteer for this study.

Thanking You,

Investigator’s Sign

Patient’s Sign

(Name:)

PROFORMA

Investigator: Dr.VAISHNAVI R.M. , PG 3rd year – MS (General Surgery)

Guide: Prof. Dr. LALITHKUMAR, Chief, Unit S6

- NAME : SL. NO:
- AGE /SEX:
- ADDRESS WITH CONTACT NUMBER:
- IP NO:
- DATE OF ADMISSION:
- DATE OF SURGERY (IF ANY) :

DATE OF DISCHARGE / DEATH :

- DURATION OF SYMPTOMS:

HISTORY OF PRESENTING ILLNESS:

PAST HISTORY:

Whether a known case of DM/HTN/ Epilepsy / Bronchial Asthma

H/O similar complaints in past.

H/O chronic drug intake

H/O any interventional procedure in past (i.eERCP) ?

PERSONAL HISTORY :

Alcoholic – How many years ?

Smoker

CLINICAL EXAMINATION

GENERAL EXAMINATION: TEMP: P.R: B.P: R.R

SPO2

SYSTEMIC EXAMINATION:

CVS :

RS :

PER ABDOMEN :

CLINICAL DIAGNOSIS:

BLOOD INVESTIGATIONS:

HB	PCV
RBC	TC
DC	PLT
RBS	S. CALCIUM
S.AMYLASE	S. LIPASE
B.UREA	S.CREAT

LFT

T.B -	D.B –
AST -	ALP –
T.PROTEINS-	S.ALBUMIN –

PT - APTT - INR –

IMAGING:

CHEST X-RAY: ABDOMEN X-RAY:

USG ABDOMEN

TREATMENT GIVEN IN FIRST 6 HOURS :

IV FLUIDS

Inj. Pantoprazole 40 mg ivbd

Inj.Tramadol 2cc i.m.bd

REASSESSMENT after 6 hours of Treatment :

Whether any improvement in symptoms or not ?

Clinical Examination –

PR - BP - TEMP- RR-

SPO2 -

CVS- RS –

P/A –

URINE OUTPUT –

BLOOD INVESTIGATIONS –

HB

TC

PCV RFT-

Treatment continued as per guidelines of fluid management based on urine output.

At the end of 12 hours, 24 hours AND 48 Hours same parameters as above noted.

CECT ABDOMEN AND PELVIS to be taken at the end of 24 hours if no improvement at the end of 24 hours with aggressive management.

PARAMETERS	AT THE END OF 12 HOURS	AT THE END OF 24 HOURS	AT THE END OF 48 HOURS
SYMPTOMS			
PR			
BP			
TEMP			
RR			
SPO2			
URINE OUTPUT			
HB			
TC			
DC			
PCV			
S.AMYLASE			
S.LIPASE			
S.UREA			
S.CREATININE			

TREATMENT AFTER REASSESSMENT

IV FLUID management

Antibiotics given or not ?

Inj. Pantoprazole 40 mg ivbd

Inj. Tramadol 2cc im bd

IF PATIENT NEEDED ICU CARE ?

IF ANTIBIOTICS GIVEN ?

WHEN ORALS STARTED ?

IF PATIENT REQUIRED ERCP ?

IF PATIENT REQUIRED SURGERY ?

CONDITION OF PATIENT AT DISCHARGE WITH FINAL DIAGNOSIS

SEVERITY OF PANCREATITIS –

MILD / MODERATELY SEVERE / SEVERE

DATE OF DISCHARGE/ DEATH –

MASTER CHART

KEY TO MASTER CHART

PR – Pulse rate

BP – Blood Pressure

RR – Respiratory Rate

SPO2 – Saturation

M – Male

F – Female

WNL - Within Normal Limits

CXR – Chest X- Ray PA view

ECG – Electrocardiography

RBS – Random Blood Sugar

TGL – Triglyceride level

T.B. – Total Bilirubin

T.C. – Total Counts

PCV – Packed Cell Volume

HB – Haemoglobin

The values highlighted in Red shows the patients with SIRS.

The yellow shaded boxes shows the patients with Organ Failure