

A study of effects of early enteral feeding in mild to moderate cases of acute pancreatitis

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Abstract

Background and objective: Acute pancreatitis is a hyper metabolic state. In the past, patients with acute pancreatitis were not given any form of enteral nutrition as it was believed that any stimulation of the exocrine pancreas would affect the disease course negatively. Now it is known that the pancreas is already at rest during pancreatitis, and restoring secretion would be a much more physiological strategy than resting the organ. Increasing evidence suggests that enteral feeding maintains the intestinal barrier function and prevents or reduces bacterial translocation from the gut. These findings along with the fact that enteral nutrition is clearly not harmful in acute pancreatitis make it an increasingly accepted treatment modality today. This study aims at occurrence of infective and non infective complications, average duration of hospital stay and need for surgical intervention in mild to moderate cases of acute pancreatitis on early enteral feeds.

Methods: After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria were enrolled for the study after obtaining informed consent. Sample size was estimated to be 72. A prospective study conducted on the patients admitted to esic mc & pgimsr with symptoms suggestive of acute pancreatitis. After the initial diagnosis and assessment, a 16 gauge nasogastric ryle’s tube was inserted for all the patients included in the study. The feeding patterns were initiated depending upon the severity of acute pancreatitis. Xiv

Results: The statistical analysis of the data obtained from our study had the following results. Most of the patients afflicted with mild to moderately severe acute pancreatitis were males (83.3%). The commonest etiological factors implicated in the causation of pancreatitis in such patients were alcohol (75%), gallstones (13.8%) and idiopathic (11.1%). In this study out of the 72 patients who were studied, 40 (55.55%) patients had mild acute pancreatitis and 32 (44.44%)

patients had moderately severe acute pancreatitis according to modified atlanta classification. All of the patients included in this study were started on early enteral feeding. Most of the patients (n=64, 89%) tolerated enteral feeding well and, only a few patients (n=8, 11%) did not tolerate enteral feeds. All the patients who did not tolerate enteral feeds complained of severe abdominal pain on initiation of enteral feeds. In these patients enteral feeds were stopped and then gradually re-introduced after a mean duration of 4 days. The overall incidence of infective and noninfective complications was low in the patients included in this study. Infective complications such as superficial thrombophlebitis, upper respiratory tract infections were found in 5% of our patients. About 7% of the patients ended up with non-infective complications such as diarrhea, acute pancreatic fluid collection, etc.the average length of hospital stay of the patients included in this study was 4 days.

Conclusion: Early nasogastric feeding in mild to moderate cases of acute pancreatitis does not influence the incidence of infective and non-infective complications, does not increase the need for surgical intervention. Also it reduces the duration of hospital stay.

Keywords: acute pancreatitis; enteral nutrition

Introduction

Acute pancreatitis is a relatively common and a potentially life-threatening disease. It is defined as “an inflammatory process of pancreas with possible peripancreatic tissue involvement and multi organ dysfunction syndrome with increasing mortality rate”¹

Estimates of incidence are often inaccurate, because mild cases are often unreported, and deaths may occur in severe forms even before a diagnosis is made.

Severe acute pancreatitis accounts for about 20 % of the cases, and it is associated with one or more of the following: pancreatic necrosis, distant organ failure, and development of local complications like haemorrhage, pancreatic necrosis, pseudocyst etc. Mortality in severe acute pancreatitis is 15-30 % and is only 0-1% in case of mild acute pancreatitis.

The exact mechanism of pathophysiology of acute pancreatitis is not clearly known, but has been attributed to abnormal activation of pancreatic enzymes within the acinar cells. Co-localization of zymogen granules and lysosomes occur resulting in activation of the enzymes, which results in auto- digestion of pancreas. In response to initial insult, acinar cells release pro- inflammatory cytokines, such as tnf a, il-1, 2 and 6, and anti-inflammatory mediators such as il-10 and il-1receptor antagonist.³⁻⁴

These mediators then propagate the response systemically as well as locally. The local response increases the permeability and alters the microcirculation and worsens the disease process. However the inflammatory response is self-limited in most of the patients, but a vicious cycle of pancreatic injury and local and systemic inflammation persists in severe forms.

Acute pancreatitis can be classified as mild and severe form. Mild acute pancreatitis is characterised by interstitial edema of the gland and is usually a self-limiting disease. Whereas in the severe form, there is pancreatic necrosis, severe systemic inflammatory response and multi – organ failure which can lead to death. Hence it is prudent to identify risk stratification tools for the disease, which help in the management.

Various criteria of severity stratification have been developed to define the severity of the disease in the

past. The earliest of which was developed by ranson and colleagues in 1974. It predicts the severity of the disease, which is based on 11 parameters that are obtained at the time of admission and after 48 hours. Ransoms' score has a low positive predictive value (50%) and a high negative predictive value (90%). Hence its main use is to rule out acute pancreatitis and also predicts a severe attack⁵. The major disadvantage ranson's and as well as older Glasgow criteria being, many of the parameters which are components of this scoring, are not collected at admission, on a routine basis. Also, it does not predict the severity of the disease at admission, as six of the parameters are assessed only after 48 hours. Hence an early therapeutic window is missed.

The APACHE II, which is the most common scoring used worldwide, was originally developed as a risk stratification tool in intensive care setting. But it takes into account a huge list of parameters, some of which may not be related to the severity.

Hence, an accurate, and relatively simple bedside scoring system bisap was developed. This scoring system identifies patients with high morbidity as well as risk of mortality, before organ failure sets in. Data for this scoring system is collected within 24 hours of hospitalization, which helps in identifying patients who are risk of developing a severe disease very early, and helps in managing the same effectively, thus decreasing the mortality and morbidity.

Materials and methods

Source of data: a prospective study was conducted on patients with acute pancreatitis of mild to moderate severity, who were be admitted in the esic-mc and pgimsr hospital, Bangalore during the study period.

Study design: prospective study

Study period: 1.5 years (March 2021 to August 2022)

Sample size: 72

Method of collection of data

Patients with clinical picture consistent with the diagnosis of acute pancreatitis, along with more than 3-fold elevation of serum amylase and elevated serum lipase were considered to have acute pancreatitis. The clinical findings considered suggestive of acute pancreatitis are as follows:

- I. Acute epigastric pain
- Ii. Radiation of pain to the back
- Iii. Associated nausea/vomiting
- Iv. History of alcoholism, history suggestive of gall stone disease
- V. Above symptomatology not attributed to any other obvious pathology

All the cases considered for the study underwent a comprehensive evaluation follows:

1. Thorough clinical history and examination with emphasis on age, character of pain abdomen, radiation to the back, history of alcoholism / gallstone disease and treatment history.

2. Biochemical investigations relevant for ranson's scoring which include:

- on admission:

Random blood sugar(rbs), total leucocyte count (tlc), serum lactate

Dehydrogenase (ldh), serum aspartate transaminase (ast), haemoglobin and Packed cell volume (pcv), blood urea nitrogen (bun), serum creatinine, Arterial blood gas analysis (abg).

- After 48 hours of admission:

Serum calcium, repeat pcv, bun, abg.

1. Imaging modalities: chest x-ray, ultrasound abdomen, contrast enhanced ctscan abdomen.

2. Based on the revised atlanta classification, the severity of acute pancreatitis were graded as mild, moderate and severe.

Inclusion criteria

1. Patient willing to give informed consent for the proposed study (**annexure-1**)
2. Age<70 years
3. Cases of mild and moderate acute pancreatitis (as per revised atlanta classification)
4. Systolic blood pressure>90 mm hg
5. Serum creatinine<2mg/dl

Exclusion criteria

1. Patient not willing to give informed consent
2. Age>70 years
3. Cases of severe acute pancreatitis (as per revised atlanta classification)
4. Serum creatinine > 2mg/dl

Statistical analysis

Data collected were entered into excel spread sheet and were analysed using SPSS. Data were analysed for descriptive and informative statistics. For descriptive statistics we calculate mean, sd, range and proportion.

Methodology

Initial diagnosis and assessment was done by the treating unit insurgery and the patients were admitted in the surgical wards. Patients wereduly informed regarding the study and after obtaining the consent, a 16 gaugenasogastric ryle's tube was inserted for all patients included in the study. The feeding patterns were initiated depending upon the severity of acute pancreatitis as follows:

Timing of enteral feeding

1)mild acute pancreatitis: started immediately on diagnosis

2)moderate acute pancreatitis: started within 48 hrs of diagnosis

Assessment of nutritional requirement^{56,62}:

The nutritional requirement was calculated based on the weight of the patient and the recommended caloric intake for that weight. The weight was measured at the time of admission or approximated using the recumbent height if patient's condition did not permit a formal measurement.

The formulae used to calculate the nutritional requirement are as follows:

Caloric intake: 35 kcal/kg/day (target caloric delivery)

Protein intake: 1.5 gm/kg/day

Fat intake : < 15% of the total calories required per day.

Patients were started on clear liquids initially followed by semisolid and then the solid diet.

The stepwise initiation of feeds was designed to minimize pain and to avoid metabolic complications due to nutritional overload in a sub optimally functioning digestive system.

Nutritional preparation used

The nutritional requirement was fulfilled using a standardized preparationto avoid differences in nutrient composition and rates of absorption. Thenutritional preparation used was **Nourish plus powder**.

Table 1: Nutritional Composition of Nourish Plus

Nutrient	Per 100mg
Calories	511.9 Kcal
Protein	24 mg
Fat	2.3mg
Carbohydrate	60mg
Calcium	100 meq
Magnesium	40 meq
Selenium	9 mcg
Chromium	16 mcg

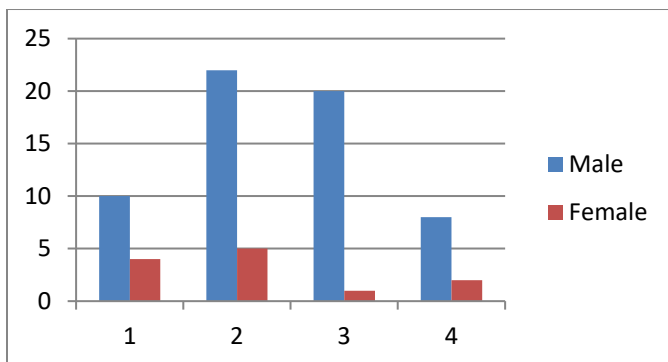
Grams of Nourish Plus required per day = Kcal required for 24 hours × 100/ 511.9. The time taken to achieve the target nutrition was calculated. Mild exacerbations of pain were treated by analgesics and antispasmodics. The patient was closely monitored for any infective and non-infective complications. Once the target nutrition was achieved and patient had normal bowel sound on auscultation, the nasogastric tube was removed and the patient started on normal oral feeds.

Observation And Results

This study was conducted in the department of General Surgery, ESIC MC and PGIMSR, Rajajinagar, Bangalore. The 72 patients with features of acute pancreatitis of mild to moderate severity, who fulfilled the inclusion criteria were enrolled in this study after obtaining an informed consent and analyzed with reference to the objectives of the study.

Table 2: Age Distribution

Age Range(years)	No. of patients	Percentage (%)
21yrs -30yrs	14	19.44
31yrs -40yrs	27	37.50
41yrs -50yrs	21	29.16
51yrs -60yrs	10	13.88
Total	72	100



Graph 1: Age wise Sex distribution in study population

Table: 3 Gender Distribution

Sex	No. of patients	Percentage (%)
Male	60	83.33
Female	12	16.66
Total	72	100

Out of 72 patients enrolled in this study there were 60 male and 12 female patients.

Male: Female ratio-5:1

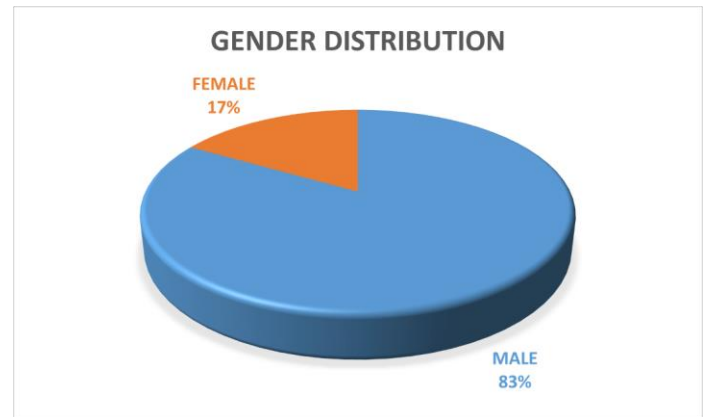


Table 4: Age Wise Sex Distribution

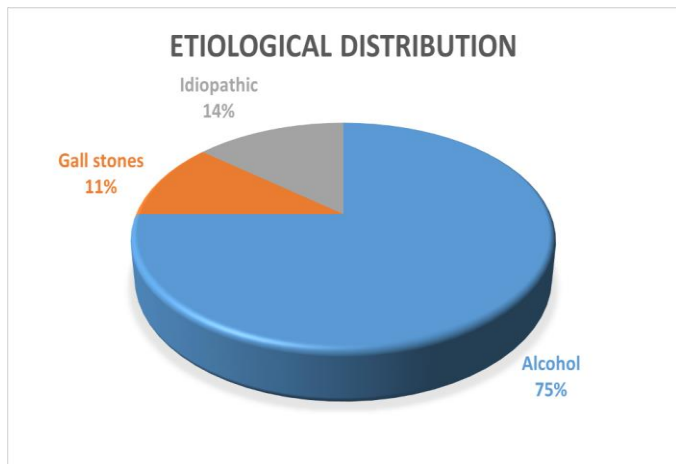
	Male		Female		Total	
	N	%	N	%	N	%
21-30	10	16.66	4	33.33	14	19.44
31-40	22	36.66	5	41.66	27	37.50
41-50	20	33.33	1	0.083	21	29.16
51-60	08	13.33	2	16.66	10	13.88
Total	60	100	12	100	72	100

Mean age group of males: 41.13 years.

Mean age group of females: 39 years

Table 5 : Etiological Distribution

Etiology	No of patients	Percentage
Alcohol	54	75%
Gall stones	8	11.1%
Idiopathic	10	13.8%

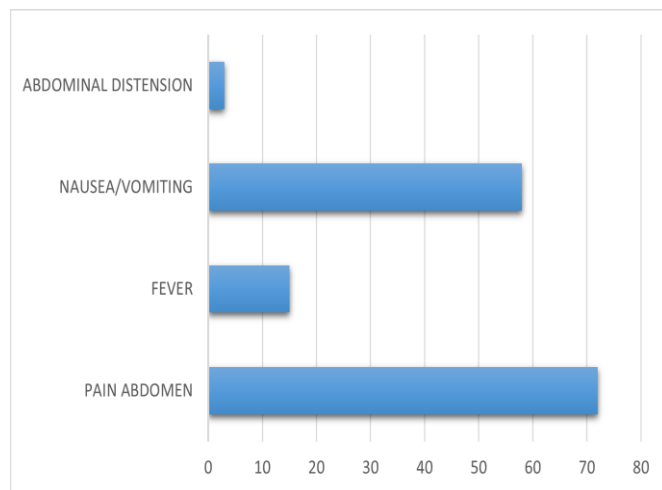


Graph 2: Etiological Distribution

Etiology: Most common etiology was alcohol in 54(75%) patients, gallstones in 8(11.1%) patients, while no cause could be ascertained in 10(13.8%) patients.

Table 6 Clinical Features

Symptoms	No of patients	Percentage
Pain abdomen	72	100%
Fever	15	20.8%
Vomiting/nausea	58	80.5%
Abdominal distension	3	4.16%



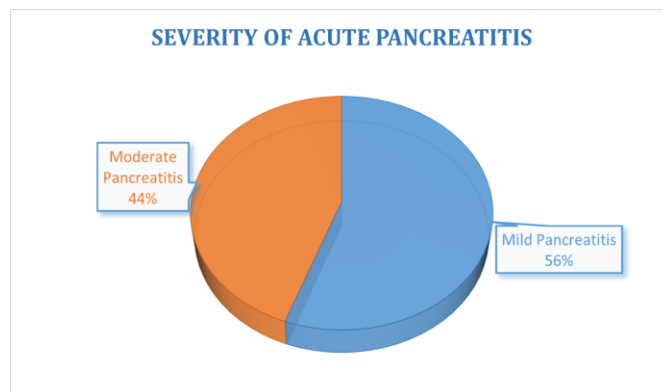
Graph 3: Symptoms In Study Population

On clinical presentation, pain abdomen was the most common symptom present in all the 72 cases, followed by nausea/vomiting in 58 cases. Abdominal distension was the presenting symptom in about 3 cases.

Table 7: Severity of Acute Pancreatitis

Severity	No of Patients	Percentage
Mild	40	55.55%
Moderate	32	44.44%

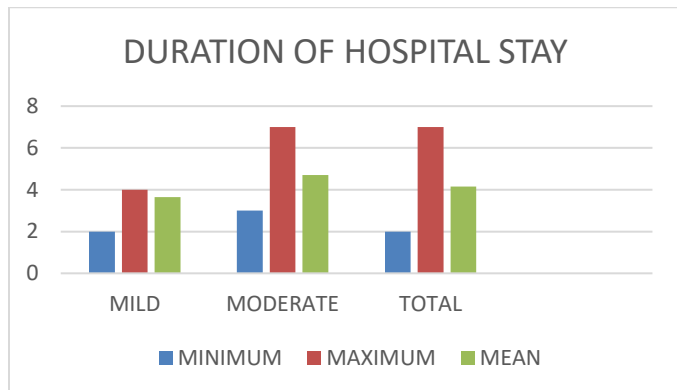
Among 72 patients, 40 cases were of mild severity and 32 cases were of moderate severity.



Graph 4: Severity of Acute Pancreatitis

Table 8: Duration of Hospital Stay In Study Population

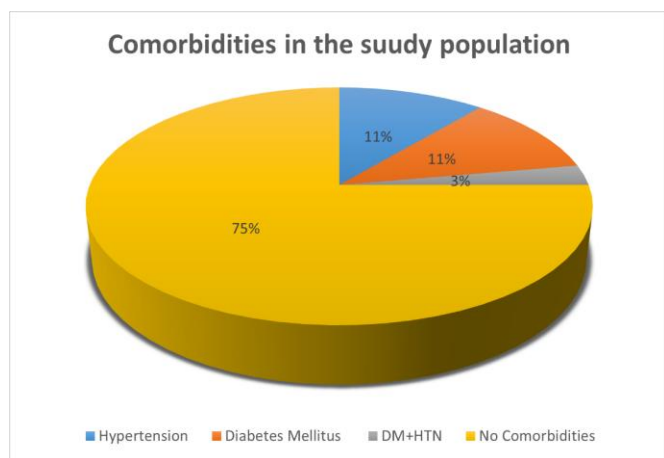
Severity	Minimum	Maximum	Mean
Mild	2	4	3.65
Moderate	3	7	4.7
Total	2	7	4.15



Graph 5: Duration of Hospital Stay

Table 9: Comorbidities In Study Population

Comorbidities	No. of Patients
Hypertension	8
Diabetes mellitus	8
HTN+DM	2
No comorbidities	54

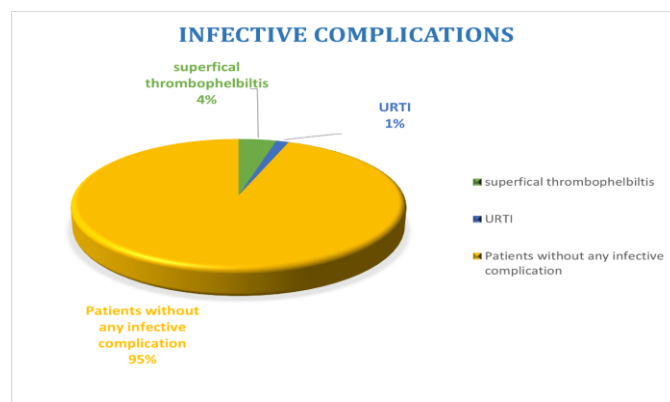


Graph 6: Comorbidities In Study Population

Amongst the 72 cases included in the study, 54 cases (75%) were uncomplicated by any co morbid conditions. 8cases had associated hypertension only, 8 cases had associated diabetes mellitus only, 2 cases had both hypertension and diabetes.

Table 10 : Infective Complications

Complications	No of Patients	Percentage
Superficial thrombophlebitis	3	4%
URTI	1	1%
TOTAL	4	5%



Graph 7: Infective complications in study population

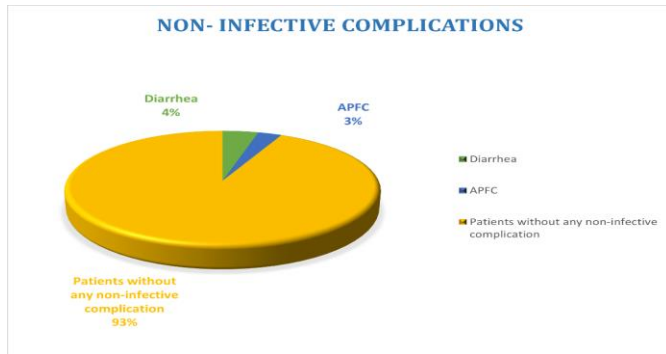
The total incidence of infective complications in the study population was 5%.However, there were no infective complications of the pancreas proper. The complications were 3 cases of IV canula induced thrombophlebitis and 1case of lower respiratory tract infection.

Surgical intervention in study population:

There was no need for surgical intervention as the cases included in the study belonged to mild and moderate group of acute pancreatitis.

Table 11: Non-Infective Complications In Study Population

Complications	No of patients	Percentage
Diarrhoea	3	4%
Apfc	2	3%
Total	5	7%



Graph 8: Non-Infective Complications In Study Population

Non-infective complications occurred in 7% of the cases. 2 cases of acute pancreatic fluid collection which was managed conservatively. 3 cases had diarrhoea on starting enteral feeding which subsided after reducing the amount of feeds given per day.

Pain during nasogastric feeding:

In the study population, 8 patients developed pain on initiation of nasogastric feeding severe enough to mandate temporary cessation of feeds. The patients who developed pain were managed with analgesics and gradual reinstatement of feeds.

Discussion

Acute pancreatitis management has undergone many changes in the recent past owing to a better understanding of the pathogenetic mechanisms. Recent evidence shows that nutritional support has an important role in the management of patients with acute pancreatitis. Earlier, the nutritional requirements of the

patients with acute pancreatitis were met by total parenteral nutrition. But the recent evidence has shown that total parenteral nutrition has got a lot of drawbacks including its high cost, higher incidence of infections, increased duration of hospital stay and no significant change in outcome as compared to enteral nutrition. Hence the mainstay of nutritional support in patients with acute pancreatitis is enteral nutrition with minimal to no role of total parenteral nutrition⁹⁰⁻⁹².

However, in India, many clinicians are apprehensive to adopt the recommendations of guidelines which are formulated based on the evidence obtained from studies conducted in the western population. The reason for this is the experience of the clinicians which suggests that total parenteral nutrition is superior to enteral nutrition and the lack of reliable studies showing the superiority of enteral nutrition in the Indian population. There is a big void in the understanding of the effects of enteral nutrition in patients with acute pancreatitis. Hence we conducted this prospective study at our hospital to study the effects of early initiation of enteral nutrition in patients with mild to moderate pancreatitis.

Multiple studies conducted in the west have shown the superiority of enteral nutrition over parenteral nutrition. The first reliable study proving the superiority of enteral nutrition was conducted by Windsor et. al. (1998)⁶³. In this study, they studied the clinical outcomes in patients with acute pancreatitis who received enteral nutrition in the form of nasojejunal feeds. They concluded that total enteral nutrition moderates the acute phase response and improves the disease severity and clinical outcome in patients with acute pancreatitis. Later several studies corroborated the findings of their study and finally meta-analysis conducted by researchers such as Maxim S Petrove et. al. (2008)⁹¹, Katalin Marta et. al. (2016)⁹⁴,

etc. established the superiority of enteral nutrition over parenteral nutrition. And finally, the recent American Association of Gastroenterologists has also acknowledged the findings of these meta-analyses and has recommended the early initiation of enteral nutrition in patients with acute pancreatitis.

In our study, most of the patients were male (83.3%) with a minority of patients being females (16.66%). This is due to the high prevalence of alcohol abuse in males as compared to females. As discussed earlier alcohol abuse is one of the most important etiological factors in the causation of acute pancreatitis. Similar results have been obtained in studies conducted previously.

The most common etiological factor for the development of acute pancreatitis in our study was found to be alcohol consumption (75%) followed by gallstones (13.8%) followed by idiopathic (11.1%) pathology. These findings were similar to the findings obtained by the previous studies conducted by Michael A Mederos et. al. (2021) and George H Sakorafas et. al (2000).

In our study, about 55.55 % of patients were diagnosed with mild pancreatitis and 44.44% were diagnosed with moderately severe acute pancreatitis. The patients with mild pancreatitis were started on enteral feeding via a nasogastric tube immediately on the day of admission. Depending upon, how well the patient tolerates enteral feeds, the Ryles tube was removed and a trial of clear liquids was given. If the patients tolerated the clear liquids slowly liquid diet and then soft diet was introduced. Enteral feeding was introduced in a similar way in a sequential manner in the patients with moderately severe acute pancreatitis, but the feeds were initiated more slowly (within 48 hours of admission), based on the clinical condition of the patient and how

well they tolerated oral feeds. These findings concur with the studies conducted by McClave et al⁶⁸.

The majority of our patients (n=64, 89%) tolerated enteral feeds well. 8 (11%) of the patients developed severe pain on initiation of enteral feeds and therefore in those patients, the enteral feeding was stopped and then slowly reintroduced at a later date depending upon how well they tolerated oral feeds.

Oral refeeding in patients not tolerating enteral feeds was well studied by Levy et. al. . In their study out of the 116 patients about 23 (21%) of the patients developed severe pain on initiation of enteral feeds and hence enteral feeding had to be stopped. And then enteral feeds were gradually reintroduced. The average time required to reintroduce oral feeds was about 7.5 ± 2.22 days. Similarly in our study, the average time required to reintroduce oral feeds was about 4 days. Similar findings were reported in a study conducted by Abou-Assi et. al⁸⁷.

Infective complications such as superficial thrombophlebitis, upper respiratory tract infections were found in 5% of our patients. About 7% of the patients ended up with non-infective complications such as diarrhea 4%, acute pancreatic fluid collection 3%. This is in comparison to published data by Abou-Assi et al⁸⁷ and Kalferentzos et al⁸⁹ who described infective complication rates of 11.1% and 27.7% respectively. The lack of pancreatic infections in our study can be attributed to the selection criteria which included mild and moderate degree pancreatitis only.

The average length of hospital stay of patients with mild to moderately severe acute pancreatitis was about 4 days. The hospital stay of patients included in our study was much lower than the previously conducted studies by

Windsor et. al. (12.5 days) and Abou-assi et. al. (14.2 days). This suggests that enteral feeding in acute pancreatitis is well tolerated and contributes to a shorter hospital stay in the Indian populace as compared to the western population. However, this could be a spurious association, and therefore to ascertain this assumption prospective studies must be conducted comparing enteral and parenteral feeding in patients with mild to moderately severe acute pancreatitis.

Table 12: Comparison of present study with previous studies

	Present study	Windsor et. al.	Abou-assi et. al.
Length of hospital stay	4 days	12.5 days	14.2 days
Infective complications	5%	Nil	11.1 %
Noninfective complications	7%	Nil	74.4%

Conclusions

- 1 Early enteral feeding is well tolerated in patients with mild to moderately severe acute pancreatitis.
- 2 Early enteral feeding has a very good clinical outcome as reflected by the duration of hospital stay which is much lower than similar studies conducted previously in the western population.
- 3 The incidence of infective and noninfective complications in patients started on early enteral feeds is very low. This is similar to multiple similar studies conducted in the past.
- 4 Enteral feeding is much cheaper than total parenteral nutrition. As enteral feeding is not associated with any adverse clinical outcomes, if it is more widely adopted in clinical practice in India, it can significantly decrease the financial burden on the healthcare system.
- 5 Early enteral feeding is a safe and economical method of nutritional support in patients with mild to moderately severe acute pancreatitis with a good

clinical outcome and without any significant adverse outcomes.

Strengths of the study

1. The sample size of 72 patients is adequate and representative of the reference population of this study ie. patients with mild to moderately severe acute pancreatitis.
2. Enteral feeding in a study population of this size will definitely bear statistical significance. The results obtained from this study are probably reflective of results that would be obtained in the reference population (patients with mild to moderately severe acute pancreatitis) if early enteral feeding is initiated.

Drawbacks of the study

This study does not employ blinding and randomization. Hence the results obtained from this study could be biased. Further research in the form of randomized control trials and meta-analysis is required to confirm the results obtained in this study.

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