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Original Research Article

Early enteral nutrition in acute pancreatitis - how beneficial is it?

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ABSTRACT

Background: Acute pancreatitis is an inflammatory disease of pancreas and is one of the leading cause of acute abdomen requiring hospital admission. Nutritional support plays a crucial role in this hypercatabolic state in not only providing calories but also in preventing complications and decreasing recovery time.
Methods: This prospective study was done among 120 patients with acute moderate and severe pancreatitis who got admitted in department of general surgery at Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India between 2018 and 2019.
Results: 67 (55.8%) patients were in early enteral and 53 (44.2%) were in parenteral/delayed enteral group. Maximum number of patients were in 30-40 years age group. The mean of patient age was 40.33. Mean duration of hospital stay in enteral group was 7.06 and in parenteral/delayed enteral group it was 14.09 ($p<0.001$). Mean pain score in enteral group was 2.69 and in parenteral group it was 6.51 ($p<0.001$).
Conclusions: There was significant ($p<0.001$) decrease in hospital stay duration and pain score in early enteral group compared to parenteral/delayed enteral group. Infections related to feeding route was found high in parenteral group. No significant difference found in complications of acute pancreatitis. Hence early enteral feeding is more beneficial in terms of shortened hospital stay, decreased pain score leading to reduction in usage of analgesics and reducing the recovery time and less nutrition related complications in management of acute moderate and severe pancreatitis.

Keywords: Acute pancreatitis, Enteral nutrition, Nutrition, Parenteral, Severe pancreatitis

INTRODUCTION

Acute pancreatitis is an inflammatory disease of pancreas and is one of the leading cause of admission to hospital for gastrointestinal disorders.[1] The spectrum of disease varies from mild, moderate to severe depending on the extent of parenchymal injury, surrounding pancreatic tissue involvement and systemic complications.[2] Gallstone disease and alcohol abuse are the commonest etiological factors representing more than 80% of the cases.[3,4]

Most patients with acute pancreatitis recover without any significant complications and are discharged within a few days of admission to the hospital.[5,6] However remaining patients suffer major complications such as infected pancreatic necrosis, which is associated with a high mortality of 15%.[7-9]

Pathophysiological mechanisms of acute pancreatitis include micro circulatory injury, leucocyte chemo-attraction, cytokines release, oxidative stress, pancreatic enzyme leakage, bacterial translocation.[10]

The majority of patients recover without incident, oral intake is tolerated without issue, and they are discharged within 48–72 hours. This suggests that early oral feeding is safe in patients with mild disease.[11]

In severe acute pancreatitis, intestinal permeability secondary to damaged intestinal epithelial cells, is notably increased, allowing for systemic translocation of

inflammatory mediators, toxins, and gut microbes. Without early interventions, increased intestinal permeability along with metabolic derangements increases risk of infections and multiorgan dysfunction leading to death.

Thus, nutrition support and optimization of intestinal function is necessary in the overall management of patients presenting with severe acute pancreatitis.[12-14]

Two methods of nutritional support (enteral and parenteral) in acute pancreatitis have been extensively studied. Previously total parenteral nutrition (TPN) was the preferred nutritional method. It was thought that parenteral nutrition provides longer resting period for the pancreas while limiting the stimulation of exocrine pancreatic secretion, minimizing enzyme-driven inflammation, and still providing patients with nutrition.[15] However lack of luminal nutrients has the potential to contribute to intestinal atrophy.

Early enteral nutrition has been found to have a beneficial effect on maintenance of both function and structure of the mucosa with regards to preservation of the integrity of the epithelial cell junctions, stimulation of brush border enzymes, and prevention of bacterial translocation.[16] Evidence suggests a resultant benefit of decreased multiorgan failure and infections.[17-20]

Our study is intended to analyse the beneficial effects of early enteral nutrition over delayed or parenteral nutrition.

METHODS

This prospective study was done between March 2018 and January 2020 in Saveetha Medical College and Hospital (a tertiary care centre) in Tamil Nadu, India. Patients who got admitted in general surgery department with first episode of acute moderate and severe pancreatitis (based on revised Atlanta classification), irrespective of aetiology were enrolled in the study.[2] Patients with acute mild pancreatitis, recurrent and chronic pancreatitis were excluded.

A total of 120 patients (males=113, females=7) were included, out of which 67 were assigned to early enteral group and 53 were assigned to parenteral/delayed enteral group. In early enteral group, nutritional feeding was started within the first 48 hours either by nasogastric or naso-jejunal tube. Tender coconut water, dhal water, rice porridge, milk, and semi-elemental diet was given. In parenteral/delayed enteral group, patients were kept nil per oral with parenteral nutritional support or enteral feeds started after 5 days of admission.

Patient's demographic data, pain score (using visual analogue scale), duration of hospital stay, complications related to nutrition and organ failure were noted and analyzed between the two groups using Chi-square test and independent 't' test.

RESULTS

Total number of patients in our study was 120 with 113 (94.2%) males and 7 (5.8%) female patients. Out of total 120 patients, 67 (55.8%) patients were in early enteral and 53 (44.2%) were in parenteral/delayed enteral group. Demographic data like age, gender and severity score were similar in both the groups (Table 1).

Maximum number of patients were in the age group of 30-40 years (n=45,37.5%). 26 (21.7%) patients were between 41-50 years, 26 (21.7%) patients were more than 50 years of age and 23 (19.2%) patients were less than 30 years of age. Figure 1 shows distribution of patients within the age groups. The mean and standard deviation (SD) of patient age was 40.33±11.925. The median age was 38 and the range 53 (19-72).

Maximum number of patients stayed in the hospital for less than10 days (55.8%). 30.8% of patients stayed between 10-15 days and 13.3% of patients stayed for more than15 days. The mean and SD of duration of hospital stay was 10.17±4.032. The median duration of hospital stay was 9 and the range was 17 (4-21).

In both the groups, maximum number of patients were in 30-40 years age group. The chi-square test showed no significant difference between the groups with respect to the age (p=0.338) (Table 2).

In enteral group, majority of patients stayed for less than 10 days whereas majority of patients in parenteral group stayed between 10-15 days. The Chi-square test showed that there is a significant difference between the groups with respect to duration of hospital stay (p<0.001) (Table 3).

Mean duration of hospital stay in enteral group was 7.06±1.369 and in parenteral/delayed enteral group it was 14.09±2.581. Comparison between the Mean and SD using independent 't' test showed that the duration of hospital stay was significantly lower in early enteral group (p<0.001) (Table 4). Figure 2 shows a box plot of distribution of hospital stay duration in the two groups.

Mean pain score in enteral group was 2.69±1.27 and in parenteral group it was 6.51±1.203. Comparison of mean and SD using independent 't' test showed pain score was significantly lower in early enteral group (p<0.001) (Table 5). Figure 3 shows a box plot of pain score distribution in the two groups.

Complications related to nutrition method and acute pancreatitis is given in Table 6. Infections mainly nutrition route related were found significantly higher in parenteral group (RR=0.13, p=0.006).

Table 1: Demographic and clinical data distribution.

Demographic and clinical data	Total N (%)	Early enteral N (%)	Parenteral/delayed enteral N (%)
Total patients (N)	120	67 (55.8)	53 (44.2)
Age (mean) in years	40.3	38.2	42.4
Male	113 (94.2)	62 (92.5)	51 (96.2)
Female	7 (5.8)	5 (7.5)	2 (3.8)
Aetiology			
Alcohol	94 (78.3)	51 (76.1)	43 (81.1)
Gall stones	15 (12.5)	9 (13.4)	6 (11.3)
Idiopathic	11 (9.2)	7 (10.5)	4 (7.6)
Severity score			
APACHE II	10.9	10.7	11.2
CT index	6.6	6.1	7.2

Table 2: Correlation between age and groups.

Age (years)	Groups		Total
	Early enteral	Parenteral/delayed enteral	
<30			
N	14	9	23
%	60.9	39.1	100
30-40			
N	22	23	45
%	48.9	51.1	100
41-50			
N	13	13	26
%	50.0	50.0	100
>50			
N	18	8	26
%	69.2	30.8	100
Total			
N	67	53	120
%	55.8	44.2	100

Chi square value (X2)=3.368, p value=0.338 not significant

Table 3: Correlation between groups and duration of hospital stay.

Duration of hospital stay (days)	Groups		Total
	Early enteral	Parenteral/delayed enteral	
<10			
N	65	2	67
%	97.0	3.0	100
10-15			
N	2	35	37
%	5.4	94.6	100
>15			
N	0	16	16
%	0	100	100
Total			
N	67	53	120
%	55.8	44.2	100

Chi-square value=104.46, p value <0.001 (significant)

Table 4: Comparison of mean and standard deviation of duration of hospital stay between groups.

Comparison for duration of hospital stay	N	Mean	SD	SE	't' value	P value
Early enteral	67	7.06	1.369	0.167	19.168	<0.001*
Parenteral/delayed enteral	53	14.09	2.581	0.355		

SD=standard deviation, SE=standard error of mean, *statistically significant

Table 5: Mean and standard deviation comparison of pain score among groups.

Comparison of pain score	N	Mean	SD	SE	't' value	P value
Early enteral	67	2.69	1.27	0.155	16.76	<0.001*
Parenteral/delayed enteral	53	6.51	1.203	0.165		

SD=standard deviation, SE=standard error of mean, *statistically significant

Table 6: Comparison of complications between the two groups.

Complication	Early enteral (n=67)	Parenteral/delayed enteral (n=53)	RR (95% CI)	P value
Need for ICU care	42	40	0.83 (0.65-1.05)	0.129
Infections (feeding related)	2	12	0.13 (0.03-0.56)	0.006*
Infected pancreatic necrosis/abscess	2	3	0.55 (0.09-3.21)	0.51
Single organ failure	42	40	0.83 (0.65-1.05)	0.129
Multiorgan failure	3	5	0.47 (0.11-1.89)	0.29
Death	3	5	0.47 (0.11-1.89)	0.29

RR=Relative risk, 95% CI= 95% of confidence interval, *statistically significant

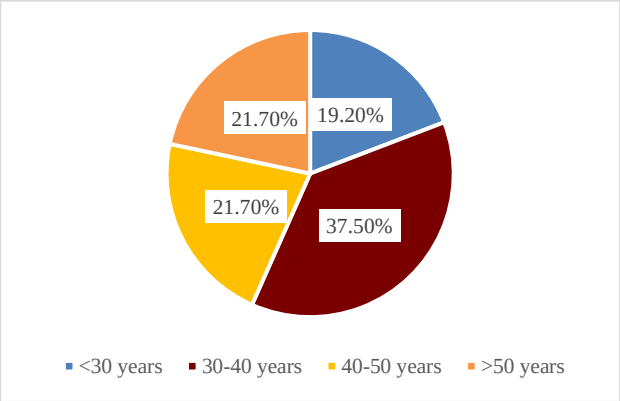

Figure 1: Distribution within the age group.

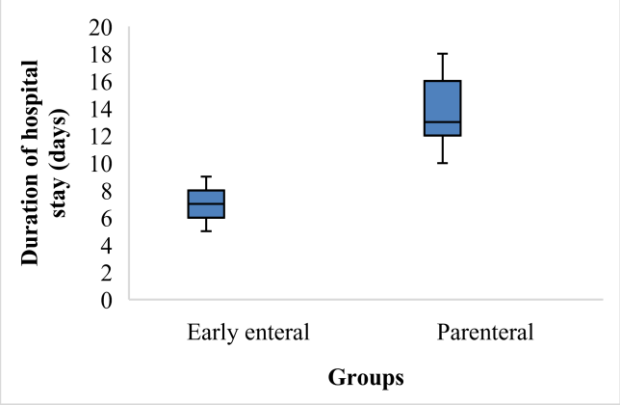

Figure 2: Box and Whisker plot showing difference between two groups in relation to duration of hospital stay.

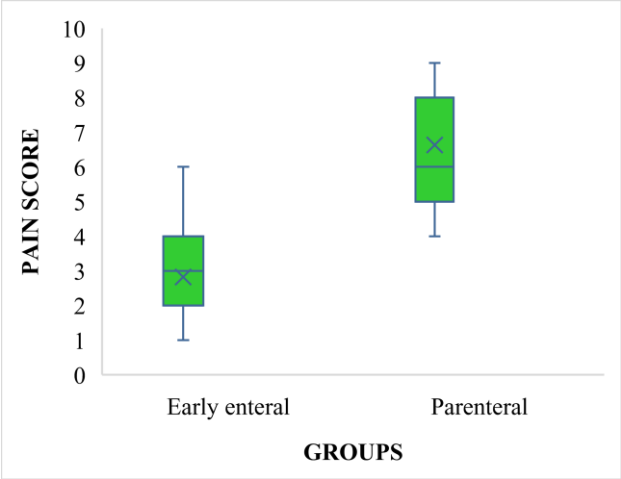

Figure 3: Box and Whisker plot showing difference between two groups in relation to pain score.

DISCUSSION

In our study of 120 patients, 67 patients were started on enteral nutrition within first 48 hours with tender coconut water, dhal water, rice porridge, milk, semi-elemental diet. Guidelines released by the American Gastroenterological Association in 2013 and subsequently in 2018 recommend the use of early (within 24 hours) enteral feeding in acute pancreatitis.[21,22] Regarding formulations for enteral feeds, a 2018 study from Japan suggests there is no clinical benefit to using elemental formulas when compared with semi-elemental and polymeric formulations.[23] 53 patients in

parenteral/delayed enteral group were kept nil per oral or oral feeds started 5 days after admission. Patients in both the groups had minimal difference in relation to age, gender, aetiology, severity of acute pancreatitis.

Mean duration of hospital stay in enteral group was 7.06 and in parenteral/delayed enteral group it was 14.09. There was a significant difference in mean duration of hospital stay between the two groups ($p<0.001$, significant). Mean pain score in enteral group was 2.69 and in parenteral group it was 6.51 ($p<0.001$, significant). In a study by Sun et al, incidence of multiple organ dysfunction syndrome, SIRS and pancreatic infection, as well as the duration of stay in the intensive care unit, were significantly lower in the early administration group (commenced within 48 hours of hospital admission) than in patients whose enteral feeding began on the eighth day of hospital stay. No difference in mortality noted between the two groups in their study.[24] This was similar to our study in terms of hospital stay, mortality, however there was no significant difference noted between the groups with respect to infected pancreatic necrosis, abscess, organ failure. Nutrition related complication rate was higher in parenteral groups most of which was catheter related (RR=0.13, $p<0.006$). In a randomized control study by Petrov et al, early nasogastric feeding reduced the intensity of abdominal pain, need for opiates and risk of oral food intolerance.[25]

In a study by Farooq et al, the mean length of hospital stay, the frequency of surgical intervention, complications and death were all significantly lower in early enteral nutrition group as compared to total parenteral nutrition group irrespective of patient's age, gender and severity of pancreatitis.[26]

Limitations

Our study was a prospective non- randomized control study. This may indicate a potential selection bias. The diagnosis of acute pancreatitis continues to be difficult due to variable presentation of disease and the diagnostic techniques also have some limitations and drawbacks.

CONCLUSION

Early enteral nutrition is definitely beneficial in patients with acute moderate and severe acute pancreatitis. It is safe and recommended to start enteral feeding within the first 48 hours. Early enteral nutrition is associated with less nutrition related complications, cost effective with respect to parenteral nutritional formulations, hastens recovery time and reduces the need for analgesics thereby minimising the cost burden on patient.

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