

Original Articles

Only home kitchen feeds v/s commercial nutritional supplementation in patients of acute corrosive injury on feeding jejunostomy

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ABSTRACT

Introduction : In present study, we present our experience of patients with corrosive injury on feeding jejunostomy enteral nutrition. We aimed to compare between exclusive home kitchen feeds and commercial feeds in maintaining nutrition in patients on enteral nutrition by feeding jejunostomy.

Materials & Methods : A case control study (50 subjects each) was conducted on patients on enteral nutrition by feeding jejunostomy. Cases included patients on feeding jejunostomy home enteral nutrition based on exclusively home kitchen feeds while controls include patients with jejunostomy feeding based on commercial protein/readymade powder supplements.

Results : On follow up, it was observed that mean hemoglobin and albumin levels of cases i.e. subjects on home based feed was significantly higher as compared to controls i.e. subjects on commercial feeds. Also, mean increase in weight gain was significantly more in cases as compared to controls at each follow up. Mean monthly cost of home based feeds was significantly lower as compared to commercial feeds (Rs. 900/- vs 16,200/-; $p < 0.05$).

Conclusion : According to the present study, there is a clear advantage of home based feeds over commercial feeds for enteral nutrition in corrosive injury. Home-made formulas also offer economic advantage over commercial feeds which places less financial burden to the concerned families and society.

INTRODUCTION

Acute corrosive poisonings may cause serious chemical injuries of the upper gastrointestinal tract, from the mouth to the small intestine. This type of poisoning occurs as a result of accidental or intentional ingestion of corrosive substances and are encountered in subjects of different ages. Contrary to corrosive poisonings in children, which are accidental in the majority of cases, poisonings in adults are with attempted or suicidal intent in 90% of the cases.¹ This type of poisoning result in serious acute complications like esophageal/gastric necrosis and perforation, metabolic acidosis, acute kidney injury, tracheal necrosis, acute respiratory distress syndrome, laryngeal edema and subsequently tracheoesophageal fistula, esophageal stricture or pyloric stenosis etc which causes significant morbidity, mortality and socioeconomic burden to family and society.

Severity of the injury depends on several factors: nature, quantity and concentration of the corrosive substance, duration of exposure, act of swallowing, presence of food in stomach, gastroesophageal reflux, various previous

pathologic conditions in the upper gastrointestinal tract and other existing morbid condition of the patient.² Acids causes coagulation necrosis and alkali causes penetrating liquefaction necrosis which causes reversible or irreversible gastrointestinal damage.

Injured mucosa, submucosa and muscular layer are regenerating poorly due to the surrounding inflammation, necrosis, microvascular thrombosis and complications. Resulting fibrosis, adhesions or circular stenosis greatly impair the upper gastrointestinal function such as impaired peristaltic and passage which leads to dysphasia or gastric outlet obstruction causing malnutrition, macro and micronutrient deficiency, weight loss, cachexia and other complications.³ These patients are under hypercatabolic state and negative nitrogen balance. Effects of the nutrition substitution in these patients reduces the risk of infection, stimulation and facilitation of healing of injuries. Therefore, early nutritional support is of great importance for the optimum treatment and outcome of these patients.^{4,5} Many of these patients comes from lower economic class so any long-

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Table 1. Home based Feeds

Home Kitchen Feed	Energy	Protein	Cost	Cost per 1500 kcal
50 gm - Gram Flour	194 kcal	9.5 gm	5 Rs.	
50 gm - Ghee	438 kcal	0.05 gm	8 Rs.	
50 gm - Jaggery	190 kcal	0.08 gm	2 Rs.	
Total 150 gm	Total 822 kcal	9.63 gm per day	15 Rs. per day	30 35 Rs. per day

Table - 2. Commercial feeds

Trade Names	Energy / 10 gms	Protein	Cost	Cost per serving	Cost per kcal	Cost per 1500 kcal
Nutrilite	40 kcal	4.1 gm	Rs. 1664	41 Rs. per 40 kcal	1 Rs.	1500 Rs. Approx.
Laminogi	30 kcal	2.2 gm	Rs. 500	12.50 Rs. per kcal	40 Pais	600 Rs. Approx.
Essential HP	36 kcal	4.8 gm	Rs. 763	19 Rs. per kcal	50 Paise	750 Rs. Approx.
Fresubin	44 kcal	1.65 gm	Rs. 499	10 Rs. per kcal	36 Paise	540 Rs. Approx.

term nutritional support through feeding jejunostomy has to be economically balanced and nutritionally optimum. In this study, we present our experience of patients on feeding jejunostomy enteral nutrition and comparison between exclusive home kitchen feeds and commercial feeds in maintaining nutrition.

MATERIALS AND METHODS

A case control study (50 subjects each) was conducted in the Department of Surgical Gastroenterology including patients of corrosive injury on enteral nutrition by feeding jejunostomy who are on OPD follow up during the study period. Cases included patients on feeding jejunostomy enteral nutrition based on exclusively homemade kitchen feeds while controls include patients on feeding jejunostomy enteral nutrition based on commercial protein/readymade supplements.

Home kitchen feeds (Table 1) consists of commonly used food items that are blenderized and given as tube feeding. This was made at patient's home by using commonly available economic food items like milk, paneer, wheat, rice, dhal, vegetable, fruits, egg, edible oil, sugar, curd etc.

calculated according to patient requirement. Commercial feeds (Table 2) include commercially available polymeric feeds and pre-digested feeds that are routinely taken used by our patients. Multivitamins and multiminerals were supplemented in both the group of patients

All patients have a feeding jejunostomy tube placed stammwhitz el technique using 12 Fr ryles tube. Feeding is administered as infusion over 30 minutes using a feeding bag every 2 hourly. Patient generally receives 8-10 feeds per day. Total calorie of 25-30 kcal/kg and protein of 1.5-2.5 g/kg were given. All patients were monitored on OPD basis every week. Patient's physical examination was done at each visit and body weight monitored. Patient's blood hemoglobin and serum albumin levels were checked at the beginning and in one month.

Statistical analysis was done using SPSS ver. 20 software. Comparisons were made by Student t-test for quantitative data and chi square test for qualitative data.

RESULTS

The mean age of the cases was 37.62 years while that of controls was 31.79 years. Study included 31 males and 69

Table 3. Mean comparison of hemoglobin levels(gm/dl) among cases and controls

Hemoglobin	Group	N	Mean	SD	P-value
Admission	Controls	50	12.25	0.47	<0.05
	Cases	50	11.30	0.68	
1st follow up	Controls	50	12.18	0.49	<0.05
	Cases	50	11.71	0.45	
2nd follow up	Controls	50	12.44	0.45	0.52
	Cases	50	12.50	0.41	
3rd follow up	Controls	50	12.58	0.44	<0.05
	Cases	50	12.96	0.55	
4th follow up	Controls	50	12.67	4.58	<0.05
	Cases	50	13.42	0.46	
5th follow up	Controls	50	12.73	4.62	<0.05
	Cases	50	13.66	0.46	
6th follow up	Controls	50	13.05	0.44	<0.05
	Cases	50	13.82	0.33	
7th follow up	Controls	50	13.48	0.44	0.39
	Cases	50	13.67	0.41	
8th follow up	Controls	50	13.46	0.62	<0.05
	Cases	50	13.98	0.44	
9th follow up	Controls	50	13.31	0.59	<0.05
	Cases	50	14.16	0.49	
10th follow up	Controls	50	12.92	0.53	<0.05
	Cases	50	14.34	0.54	
11th follow up	Controls	50	12.77	0.50	<0.05
	Cases	50	14.49	0.39	
12th follow up	Controls	50	12.48	0.46	<0.05
	Cases	50	14.61	0.28	

females. On follow up, it was observed that mean hemoglobin, mean increase in weight gain and albumin levels of cases i.e. subjects on home based feed was significantly higher as compared to controls i.e. subjects on commercial feeds (Table 3,4&5). Mean monthly cost of home based feeds was significantly lower as compared to commercial feeds (Rs. 900/- vs 16,200/-; p<0.05) (Table 6).

DISCUSSION

Aim of the treatment of acute corrosive intoxications is to prevent perforation and progressive fibrosis, and

esophageal and gastric stenosis. There are different, and often conflicting positions, on the conservative treatment of acute corrosive intoxications in adults. Such treatment mainly consists of anti-secretory treatment, antibiotics and intensive hyper-alimentation, aiming to prevent late post-corrosive intoxication complications.^{6,7} It is considered that nutritional support plays a major role in maintenance of metabolic processes and prevention of severe metabolic complications that could additionally aggravate the condition and impair the treatment.

Table 4. Mean comparison of S. albumin levels(gm/dl) among cases and controls

S. Albumin	Group	N	Mean	SD	P-value
Admission	Controls	50	3.29	0.20	0.39
	Cases	50	3.26	0.18	
1st follow up	Controls	50	3.27	0.19	<0.05
	Cases	50	3.84	0.19	
2nd follow up	Controls	50	3.47	0.19	0.52
	Cases	50	4.25	0.23	
3rd follow up	Controls	50	3.59	0.17	<0.05
	Cases	50	4.34	0.22	
4th follow up	Controls	50	3.72	4.55	<0.05
	Cases	50	4.49	0.21	
5th follow up	Controls	50	3.84	4.56	<0.05
	Cases	50	4.60	0.23	
6th follow up	Controls	50	3.87	0.18	<0.05
	Cases	50	4.80	0.18	
7th follow up	Controls	50	4.00	0.18	<0.05
	Cases	50	4.59	0.55	
8th follow up	Controls	50	4.09	0.20	<0.05
	Cases	50	4.37	0.50	
9th follow up	Controls	50	4.16	0.26	0.16
	Cases	50	4.25	0.40	
10th follow up	Controls	50	3.96	0.30	<0.05
	Cases	50	4.47	0.33	
11th follow up	Controls	50	3.80	0.22	<0.05
	Cases	50	4.71	0.25	
12th follow up	Controls	50	3.66	0.24	<0.05
	Cases	50	5.01	0.14	

Nutritional support has been one of the most controversial procedures in modern medicine for a very longtime. Twenty years ago, Koretz commented on the nutritional support that there are no sufficient evidence-based medical information to conclude on the indications and the need of nutritional support. However, in the past period, position has changed completely, and currently, there is a strong evidence confirming that malnutrition is independent risk factor for higher morbidity, lower quality of life, longer hospital stay, delayed recovery time, higher

hospital costs and higher mortality.^{8,9} In critically ill patients complications increase 4-fold, and mortality 6-fold if the albumin level is below 35 g/L.¹⁰

Artificial nutritional support dates from 1850 year when a gastro-stoma for nutritional support was implanted for the first time in a child with severe esophageal injuries caused by caustic. Actually, discussing the nutrition in acute corrosive intoxications, debates are still ongoing on the most adequate type of artificial support before physiologic feeding per mouth is initiated. DiConstanzo

Table 5. Mean comparison of percentage increase in weight at each follow up among cases and controls

% of Increase in Weight	Group	N	Mean	SD	P-value
1st follow up	Controls	50	0.52	0.25	<0.05
	Cases	50	1.23	0.25	
2nd follow up	Controls	50	0.86	0.85	<0.05
	Cases	50	1.25	0.31	
3rd follow up	Controls	50	1.18	13.41	0.485
	Cases	50	2.48	0.25	
4th follow up	Controls	50	0.69	0.24	<0.05
	Cases	50	1.30	0.33	
5th follow up	Controls	50	0.70	0.19	<0.05
	Cases	50	1.20	0.26	
6th follow up	Controls	50	0.66	0.18	<0.05
	Cases	50	1.20	0.22	
7th follow up	Controls	50	0.49	0.69	<0.05
	Cases	50	1.21	0.13	
8th follow up	Controls	50	0.44	0.81	<0.05
	Cases	50	1.17	0.10	
9th follow up	Controls	50	0.42	0.97	<0.05
	Cases	50	1.05	0.09	
10th follow up	Controls	50	0.41	0.31	<0.05
	Cases	50	1.05	0.08	
11th follow up	Controls	50	0.45	0.46	<0.05
	Cases	50	1.30	0.10	
12th follow up	Controls	50	1.13	0.29	0.136
	Cases	50	1.47	0.31	

Table 6. Mean comparison of monthly cost among cases and controls

Cost per month (Rs/-)	Group	N	Median	IQR	p-value <0.05
	Controls	50	900.0	750.0	
	Cases	50	16200.0	18000.0	

followed the patients who suffered acute corrosive intoxications with serious post-corrosive esophageal and gastric complications. He suggested use of intensive hyper-alimentation in the first 7 days after intoxication and did not recommend feeding through mouth during the treatment, as it might lead to additional worsening of the patient's condition.¹¹

Selection of an appropriate formula for Enteral feeding is mostly dependent on the following factors: nutritional needs of the patient, function of the patient's digestive system, location of the tube end (stomach or intestine), food sensitivities and/or lactose intolerance in the patient, and the amounts of sodium, potassium, magnesium and phosphorous available in the formula,

particularity in the patients suffering from renal, hepatic or cardiac-respiratory failure. To our best knowledge, there are no studies in India who compared exclusive home kitchen feeds with commercial feeds in maintaining nutrition in patients on tube feeds. In present study, we thus attempted to fill this void in our literature.

In present study, we demonstrated that mean hemoglobin and albumin levels of subjects on home based feed was significantly higher as compared to commercial feeds through feeding jejunostomy. Also, mean increase in weight gain was significantly more in cases as compared to controls at each followup. Mean monthly cost of home based feeds was significantly lower as compared to commercial feeds.

There are few studies on the cost effectiveness of home-made formulas as compared to the commercial formulas. In a clinical trial on 82 patients with intestinal fistula, home-made formula was compared versus hospital (commercial) formula. The results showed a shorter hospital stay in home EF group with a significantly lower costs and increased quality of life. However, there were no significant difference in duration of EF and the incidence of complications between two groups.¹² Another study reported that implementation of home enteral nutrition improved clinical outcomes and decreased health care costs through weight gain in patients, reduced incidence of infectious complications and the cost of hospitalization.¹³ However, the amount of nutrient intakes from home-made formulas should always be taken into consideration as the amount of some micronutrients may be higher and that of some others be lower than the recommended values. Considering an effective process in or order to standardize home-made formulas and to ensure their nutritional adequacy is essential.

Overall the financial difference between home and commercial feeds (Rs 900/ vs 16,200/ month) and the fact that current nutritional services are not covered by insurance may cause patients and their care-givers prefer using a home-made formulas. However, the issues of safety and ease of preparation of commercial formulas should not be ignored. Additionally, in cases of a need for using such especial formulas as elemental formulas, it is very hard, if not impossible, to make it at home. Overall, the attempts of scientific bodies of clinical nutrition should be towards both improvement of the quality and reduction the costs of commercial formulas and provision guidelines for making efficient home-made formulas. Nonetheless, assuming the cost of one night stay in ICU and the cost of one day use of commercial

formulas, if using these formulas can reduce the length of stay in the ICU and overall length of hospitalization even for one night, they can reduce the cost of treatment and save money.

CONCLUSION

According to the present study, there is a clear advantage of home based feeds over commercial feeds for enteral nutrition through feeding jejunostomy in patients with corrosive injury with regards to nutritional status of the patients. Home-made formulas also offer economic advantage over commercial feeds which places less financial burden to family and society.

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