

EFFECT OF INDIGENOUS ENTERAL FEED PROTOCOL TO IMPROVE THE GENERAL AND LOCAL CONDITION OF SEVERE BURNS PATIENTS**MOHIT KUMAR PATEL^{a1}, R. RAVISHANKER^b, YASHASHVI CHOUDHARY^c AND PUSHPLATA PATEL^d**^aDepartment of General Surgery, Pt JNM Medical College, Raipur Chhattisgarh, India^bDepartment of Burn & Plastic Surgery, Pravara Institute of Medical Sciences Loni, Taluka Rahata Ahmednagar, India^cDepartment of Surgical Oncology Resident, Kokilaben Dhirubhai Hospital Mumbai, India^dDepartment of Cardiothoracic Surgery, Pt JNM Medical College, Raipur Chhattisgarh, India**ABSTRACT**

The present study was carried out in department of general surgery, Pravara Rural Medical College & Research Hospital, Loni. Duration of study was two year. We studied 35 patients of mixed thermal burn patients who were fed enterally the indigenous preparation which was made from locally and easily available materials. In present study of 35 burn patients, maximum i.e 62.9% (22) were within 21 to 40 years age group and 20% (7) were below 20 years age. Total mean duration of formation of granulation tissue in burn patients was 14.23 days. There was statistically highly significant ($p < 0.01$) higher mean duration of granulation tissue formation with increasing percentage of burn. Starting of separation of slough took mean 9 days duration in patients with 21 to 30% burn, at 11.2 mean days with 31 to 40% burns, at mean 12.30 days with 41 to 50% burns and at 12.3 days in patients with 51 to 60% burn. Indigenous feed preparation protocol was effective in meeting the nutritional demand of the burn patient and had a favourable clinical course as evident by: Early and progressive improvement in the general condition of the burn patients.

KEYWORDS: Indigenous Enteral Feed, Burn Injuries, Low Cost, Granulation

Thermal injury is a most severe injury where catabolism is about twice normal when the burn percent reaches about 40 percent of total surface area. Severe burn injury is associated with metabolic alterations that persist for up to 24 month post burn. (Felicia N Williams et al 2009).

Nutritional support plays an important role in the treatment of patients with burns. As is widely reported in the literature, the early initiation of enteral nutrition support in the burn population is of utmost importance for survival. (Rodriguez N.A et al 2011, Kathryn L. Hall et al 2012) The composition of this enteral nutrition support is equally important. The provision of the right balance of macro and micronutrients, antioxidants and energy is essential for mitigating the hypermetabolic and hypercatabolic state that results following a burn injury (Rodriguez N.A et al 2011, Kathryn L. Hall et al 2012). Due to the severe hypercatabolism that develops in these patients, it essential to initiate artificial nutritional support (either enteral or parenteral). Enteral nutrition has been found to be more physiological than parenteral, and data exists which show that in patients with burns, enteral nutrition exercises a protective effect on the intestine and may even reduce the hypermetabolic response in these patients.

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An ideal nutritional supplement should meet the protein, calorie, fat requirement, and in addition supply of various amino acids, minerals and trace elements. Commercially manufactured preparations which provide the above requirements are not readily available everywhere, especially in a rural area. In addition they are expensive and beyond the affordability of rural population. Hence in this study a formulation made up of locally and easily available cheap materials is used to provide the best nutrition.

Objective of this study was to provide nutrition via enteral route within 6 - 18 hours post burn injury. To promote optimal wound healing and improvement in general condition of burn patient.

MATERIALS AND METHODS

The present Descriptive study was carried out in department of general surgery, Pravara Rural Medical College & Research Hospital, Loni. Duration of study was two year from 15/09/2013 to 15/09/2015. We studied 35 patients of mixed thermal burn patients who were fed enterally the indigenous preparation which was made from locally and easily available materials and was cost effective.

Inclusion Criteria

All admitted patients coming to PRH with history of burns 1. Total burn surface area >20% up to 60%. 2. Who are giving consent for the study. 3. In paediatrics patient – parents / guardian consent taken.

Exclusion Criteria

Patient with severe inhalation injury, Neonates, Patient who have head injury and poisoning. The enteral feed protocol providing high calories, high proteins for burns patients to be made utilizing easily and locally available indigenous material like milk, eggs, sugar, butter /cooking oil etc.

- Feeds to be administered through naso-gastric tube of appropriate diameter and softness.
- The naso-gastric tube is to be inserted after proper motivation of the patients, using adequate sedation, lubrication with Lignocaine jelly and using a gentle technique.
- Enteral feed started as early as possible but definitely within 8-10 hours after burn injury.
- Each feed to be administered through RT should have following components

Egg- Approx 300Gms (5-7 eggs depending on size of the egg), Butter- 25gms (cooking oil/ ghee in winters), Sugar -50gms, Milk 500ml

- Feed to be thoroughly blenderised.
- The feed to be administered slowly @ rate of 3ml/ min each feed of 500ml given over 2-3hours, start with small feeds of 10-50ml and then gradually increased in the presence of good tolerance.
- The Ryles tube is to be flushed with water/Saline after each feed.
- The nutritional value for each feed is approximately

Proteins 45gms, Fat 55gms, Carbohydrate 60gms, Energy 990kcal

MICRONUTRIENTS

Cholesterol - 248 mg, Selenium - 20.7 microgm, Phosphorus - 132 mg, Iron - 1.2 mg, Zinc - 0.93 mg, Calcium - 37.3 mg, Sodium - 94.66 mg, Potassium - 92 mg, Magnesium - 8 mg, Choline - 168 mg, Riboflavin - 0.26 mg, Vit B12 - 0.66 microgm Folate - 32 microgm, Vitamin D - 54.66 IU, Vitamin A - 360 IU, Vitamin B6 - 0.033 mg, Vitamin E - 0.66 mg.

Average Estimation of Energy Requirement

As per Curreriet al 1975 formula: 25 kcal/kg body weight+40 kcal% TBSA burns

In our study mean weight was approximately 40kg.

An average 40 kg patient requires approximately

20% TBSA=1800 kcal, 30% TBSA=2200 kcal, 40% TBSA=2600 kcal, 50% TBSA=3000 kcal, 60% TBSA=3400 kcal.

Protein requirement as per Daves and Liljedahl et al 1971

For adults: 1 gm/kg + 3 gm/%BSAB (body surface area of burn)

RESULTS

In present study of 35 burn patients, maximum i.e 62.9% (22) were within 21 to 40 years age group and 20% (7) were below 20 years age. Also 17.1% burn patients had age within 41 to 60 years. Male Burn patients were 48.6% and female patients were 51.4% out of total 35 burn patients. Male to female ratio of burn patient was 1:1.1.(Table,1)

Table 1: Age group wise distribution of burn patients

Age Group (years)	No. of patient	Percent
<= 20	7	20.0
21 to 40	22	62.9
41 to 60	6	17.1
Total	35	100.0

Percentage Burn was found to be within 21% to 30 % in 31.4% patients, in 31 to 40% in 25.7% patients, while 22.9% had 41 to 50% burn and 20% had 51 to 60% total body burn.

On admission of burn patients at 1st week the general condition of maximum i.e 51.4% was poor and 34.3% was moderate. At 2nd week 31.4% had moderate and 20% had poor GC. In 3rd week 31.4% had fair and 42.9% had moderate GC while still 11.4% had poor GC. At 4th week the GC of 53.1% was fair and 28.1% was moderate while 18.8% was good. 66.7%, 43.8% , 70%, 50% , 100% and 100% of the patients remaining up to 5th, 6th, 7th, 8th , 9th and 10th week respectively had fair GC (Table, 2).

Table 2: Weekly General condition of burn patients

General Condition	Good	Fair	Moderate	Poor	Total
1 st Week		5(14.3%)	12(34.3%)	18(51.4%)	35(100.0%)
2 nd week		17(48.6%)	11(31.4%)	7(20%)	35(100.0%)
3 rd week	5(14.3%)	15(42.9%)	11(31.4%)	4(11.4%)	35(100.0%)
4 th week	6(18.8%)	17(53.1%)	9(28.1%)		32(100.0%)
5 th week	7(33.3%)	14(66.7%)			21(100.0%)
6 th week	9(56.2%)	7(43.8%)			16(100.0%)
7 th week	3(30%)	7(70%)			10(100.0%)
8 th week	2(50%)	2(50%)			4(100.0%)
9 th week		2(100.0%)			2(100.0%)
10 th week		1(100.0%)			1(100.0%)

Formation of granulation tissue occurred at mean 11.73 days duration in patients with 21 to 30% burn , at mean 14.89 days duration with 31 to 40% burns . at 16.38 days duration in 41 to 50% burns and at mean 15.29 days duration in patients with 51 to 60% burn. Total mean

duration of formation of granulation tissue in burn patients was 14.23 days. There was statistically highly significant (p<0.01) higher mean duration of granulation tissue formation with increasing percentage of burn (Table 3).

Table 3: Granulation tissue formation within percentage of burn

Burn Percentage	Granulation formation (days)			
	Mean	S.D	Minimum	Maximum
21 to 30%	11.73	2.24	9	17
31 to 40%	14.89	1.54	12	17
41 to 50%	16.38	1.60	14	18
51 to 60%	15.29	1.80	12	18
Total	14.23	2.56	9	18

ANOVA	Sum of Squares	df	Mean Square	F	p value
	117.169	3	39.056	11.382	<0.001

Starting of separation of slough took mean 9 days duration in patients with 21 to 30% burn, at 11.2 mean days with 31 to 40% burns, at mean 12.30 days with 41 to 50% burns and at 12.3 days in patients with 51 to 60% burn.

Total mean duration of separation of slough in burn patients was 11.4 days. There was statistically highly significant (p value 0.005) higher mean duration of separation of slough with increasing percentage of burn(Table, 4).

Table 4: Time of starting of separation of slough with percentage of burn

Burn Percentage Group	Separation of Slough (days)			
	Mean	S.D	Minimum	Maximum
21 to 30% (n=5)	9	1.6	7	11
31 to 40% (n=6)	11.2	1.3	10	13
41 to 50% (n=7)	12.3	1.5	10	14
51 to 60% (n=7)	12.3	1.7	10	14
Total	11.4	1.9	7	14

ANOVA	Sum of Squares	df	Mean Square	F	p value
	40.070	3	13.357	5.645	0.005

In our study mean weight was approximately 40kg. Thus for an average 40 percent burn patient of weight 40 kg, nutrition requirement would be full filled by: Approximately 3- 4 feeds of our indigenous preparation (in

divided amount as per tolerance of patient), costing up to Rs.260 per day, While commercial preparation will require approximately 5 bottles (200 gm each) of costing up to Rs.1450 per day(Table ,5)

Table 5: Comparison of nutritional value & cost of commercial and indigenous preparation

	COMMERCIAL PREPARATION (200gm)	INDIGENOUS PREPARATION (500ml)
ENERGY (kcal)	606	900
Protein (gm)	21	45
Carbohydrate (gm)	157	60
Fat (gm)	1.2	55
Cost per feed (Rs.)	290	65

DISCUSSION

Thermal injury is a state of hypermetabolism and hypercatabolism, which results in progressive weight loss, and progressive skeletal muscle wasting and therefore aggressive nutritional support is of paramount importance for the survival of the burn patient.

In this study we have observed that immediate postburn enteral feeding protocol is a safe and effective method of delivering nutritional demands of the burn patients. It helps to meet the caloric requirements in burned patient and also helps to decrease the hypermetabolic & catabolic state. Patients who received enteral nutrition in the early post burn period experienced a lower incidence of systemic infection. It helps in early restoration of weight and proteins to normal level. It promotes early wound healing and recovery.

General condition of the Patient

The results of this study demonstrated that after admission of burn patients, by first week the general condition of maximum pts were moderate to poor, which changed to moderate and fair general condition by second week. By end of third week maximum burn patients had fair general condition. General condition of burn patients continued to improve with time.

The results of this study demonstrated that patients with burns who received enteral nutrition in the post burn period experienced a lower incidence of infection. Compatible with these findings, we found that an improvement in the general condition faster in patient who

received enteral feed with time however from the 4th week onwards. This is consistent with studies done by Sutherland et al 1976 who proved that enteral feeding led to early improvement in the general condition of the burn patient. It is also consistent with another study done by Hart et al. 2003 who found that aggressive enteral feeding attenuated muscle catabolism and improved infection outcomes after burn injuries.

Condition of Wound

The results of this study demonstrated that separation of slough was noted in maximum i.e. 31.4 percent burn patients by 10th day. Total mean duration of separation of slough in burn patients was 10.94 days. There was statistically very highly significant ($p < 0.001$) correlation between duration of separation of slough with percentage of burn i.e. as percentage of burns increases separation of slough is delayed. Granulation tissue formation was found in maximum i.e. 25.7percent patients by 15th day. Total mean duration of formation of granulation tissue in burn patients was 14.23 days. There was statistically highly significant ($p < 0.01$) correlation between duration of granulation tissue formation with percentage of burn.

CONCLUSION

We concluded that this enteral feed protocol was effective in meeting the nutritional demand of the burn patient and had a favorable clinical course as evident by: Early and progressive improvement in the general condition of the burn patients. Early separation of slough and

formation of granulation tissue which led to early wound healing in all group of burn patient and rapid recovery from burn injuries. Well tolerated indigenous preparations which were socio economically acceptable. Hence indigenous feed preparation can be recommended in treatment of burn patient as it cost effective and nutritionally superior to commercial available preparation.

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