

# Enteral Nutritional Management in Trauma Patients Blenderized Feeds versus Immunosupplemented Feeds

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**Abstract :** As patients with head injury and polytrauma have an increased basal metabolic rate and catabolism their nutritional requirements substantially increase. At the same time they have an obtunded sensorium and are unable to accept orally for a prolonged period of time. These patients should receive optimum nutritional support after 48 hours of injury to prevent multiple organ failure and sepsis. We studied the effect of blenderized versus immunosupplemented feeds. Patients in the age group of 20-35 years were selected and randomly divided into two groups of twenty five patients each. Energy requirements were calculated by the Harris-Benedict Equation. Protein requirement was calculated so as to have a C/N ration of 90:1. Control group received blenderized enteral feeds whereas study group received added immunonutrients for a period of two weeks. Enteral feeding was started within 48 hours of injury and the patient's full nutritional requirements were reached by day four. Patients were assessed by maintaining daily nutrient intake record, serum albumin level and nitrogen balance on the admission and discharge, I.C.U. stay and length of stay. Patients were studied till discharge. Patients with diabetes, intraabdominal injury and absent bowel sound were excluded. P value was calculated by paired t test. Results showed that study group had significant increase in the nitrogen balance at discharge [ $<0.05$ ] reduced ICU stay and length of stay as compared to control group but control group also showed a positive balance [ $<0.05$ ], which was cost effective. We conclude that giving early enteral nutrition with a C:N ratio of 90:1 helps in better outcome. Immunonutrients supplementation certainly helps in increased nitrogen retention and reduces length of ICU stay.

**Keywords:** enteral nutrition, immunonutrients, nitrogen balance, trauma.

## Introduction

Injury to the body leads to a stress response, which is characteristic of hyper metabolism, impaired protein synthesis and catabolism. Whole of this effect mobilizes the body's resources to meet the increased energy demands. Muscle and visceral proteins are broken down for energy and there is a negative nitrogen balance. Therefore optimum nutritional support is a mandatory part of the therapy of major injuries, which if given appropriately and early can significantly reduce complications and improve recovery. Now the question that arises is the type of feeds. The conventional blenderized enteral feeding has been used for quite some time. The newer immunopotentiated preprepared feed supplements are now available. To understand and compare the effect and efficacy of both these diets the following prospective randomised study was conducted. Thus present study was conducted to :

1. Study and compare the effect of blenderized feeds versus Immunosupplemented feeds .
2. Maintain nitrogen balance by providing optimum nutrition.

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## Materials and Methods

Male patients admitted in the year 2001 to 2002 with head injury and polytrauma in the age group of 20-35 years were enrolled in the study. The exclusion criteria were Diabetes, Intra-Abdominal injury, absent Bowel sounds, and major disease prior to trauma. Study and control group both had twenty-five patients each.

## Methods

Patients with head injury and polytrauma were selected and randomized to receive either blenderized high calorie high protein feeds or the one supplemented with immunonutrients after admission to the I.C.U. Energy requirements were calculated by Harris-Benedict equation which is very commonly used.(1)

BEE(Men):-  $66.47 + 13.75 (Wt \text{ In Kg.}) + 5(Ht \text{ in Cm}) - 6.76(\text{Age in Years})$

Where BEE is Basal Energy Expenditure. The BEE was modified depending upon the degree of stress and amount of activity.

$TEE = BEE \times \text{Activity Factor} \times \text{stress Factor.}$

where TEE is Total Energy Expenditure

Activity Factor = 1.2 For bedridden

1.3 For Ambulatory.

Stress Factor = 1.2 For Mild Hyper metabolism

## 1.5 For Moderate hyper metabolism

## 1.8-2.5 For Severe Hyper metabolism.

The protein was provided to make a calorie to nitrogen ratio of 90:1. The Immunosupplemental group received more nitrogen as compared to control group because of added immunonutrients. The blenderized feeds were prepared using milk, eggs, bananas, sugar, dal, cereals, and vegetables. Study group received added immunonutrients to this blenderized diet, which was IMPACT, for a period of two weeks.

Initially one sachet per day was supplemented which was later increased to four sachets by fourth day. The enteral feed was started after 24 Hrs. of injury after hemodynamics was stabilised at the rate of 25 ml. hourly and was progressed to 125 ml. by 3-4 days. The patients full nutritional requirements were reached by day four. Nasogastric tube feeding was continued until the patients were able to eat full requirements orally. As the enteral nutritional support progressed patients were observed for the incidence of diarrhoea, abdominal distention, and vomiting. In case of diarrhoea, which was defined as more than four stools per day, the feed was suitably modified.

Patients were studied till discharge and were regularly assessed by maintaining nutritional intake records, I.C.U. stay, length of stay, and the length of stay was defined as the number of days from study entry (0) to the actual date of hospital discharge. Patients who were transferred to a rehabilitation facilities were considered discharged.

The biochemical parameters used for assessment were:

**1. Serum Albumin** -As serum albumin concentration is the best single nutritional test for predicting outcome; it was measured on admission and discharge. An albumin level between 2.8-3.5 grams/dl represents mild protein depletion, 2.2-2.7 grams/dl moderate depletion and less than 2.2 grams/dl severe depletion<sup>2</sup>.

**2. Nitrogen balance** -Nitrogen balance is used most commonly because of its ease in the measurements. Protein turnover indicating the degree of catabolism or anabolism is calculated by subtracting the excreted nitrogen in the urine as urinary urea nitrogen from the dietary nitrogen intake<sup>3</sup>.

Nitrogen balance = (Dietary protein/6.25) - 9UUN/0.8) + 4.

**3. p value** - p value was calculated using paired test to interpret the significance.

## RESULTS

Results showed that the control group who received only

blenderized diet had a positive nitrogen balance on discharge, whereas, serum albumin remained same on discharge. Study group who received immunonutrients showed a much higher nitrogen balance and increase in serum albumin as compared to the control group which was statistically significant (p. <0.05). The serum albumin level in both the group showed no nutritional depletion. Furthermore the immunosupplemented group had a reduction in length of hospital stay and ICU stay. The results signified that giving blenderized high calorie high protein diet with C:N ratio of 90:1 in patients with head injury and polytrauma is cost effective. However immunonutrients certainly helped reducing length of stay and ICU stay, and they can be supplemented in septic patients.

**Mortality:** Five patients had mortality one in the control group and four in the study group. These patients had mortality because of acute respiratory distress syndrome, aspiration and multiple organ failure.

## DISCUSSION

No patients are more difficult to feed than those with critical illness and injury. The hypermetabolic and catabolic response brought on by injury, shock and sepsis calls for reprioritising the normal nutrition homeostasis of the body. As a response to these insults catecholamine, cytokine and Insulin levels rise leading to increased energy expenditure and protein turn over. The rate of lean tissue loss is 2-3 times greater. So the goal is maintenance and repletion, which can be achieved by timely provision of an optimum nutritional support through enteral route.

The effect of an enteral nutritional formula supplemented with immunonutrients versus blenderized feeds in a group of patients with head injury and polytrauma was studied.

The results of study showed a good positive nitrogen balance in study and control group in a statistically significant number of patients (p<0.05). The study group, which received immunonutrients showed a much higher positive nitrogen balance as compared to control group. Nitrogen balance is a measure of daily intake of nitrogen minus excretion.

A positive nitrogen balance typically in the range of 2-4 Gms. of nitrogen per day is desired but is difficulty to achieve in these hypermetabolic injured patients. In our study probably immuno-supplemented group had the benefit of receiving branched chain amino acids, which helped in better nitrogen retention. Branched chain amino acids, are essential amino acids and the primary energy source of peripheral tissues such as skeletal muscle and their supplementation have been found to improve nitrogen

balance<sup>4,5</sup>. In injured patients numerous metabolic process combine to produce a hypermetabolic state characterized by negative nitrogen balance. The protein degradation and synthesis typically increases with a net protein decrease or catabolic effect. Calorie and protein supplementation assists in minimizing net protein loss but are not always successful in achieving a positive nitrogen balance. We in our study were able to achieve a positive balance by providing high calorie high protein feeds through enteral route.

Both the groups tolerate blenderized feeds very well except that few patients in immuno-supplemental group showed initial intolerance to IMPACT that was later improved, as it was gradually increased. Both the group did not require any parenteral supplementation and were feed by nasogastric tube for on a average 8 days .In critically ill injured patients an optimum nutritional support may do more than just to prevent morbidity or death by the starvation. Attenuation of the hypermetabolic response to injury decreased infectious complications and preservation the mucosal integrity of the gut by giving enteral feeding<sup>6,7,8</sup>.

When the gastrointestinal tract is available for use enteral nutrition is favored over parenteral nutrition because it is physiological and less expensive. And for trauma patients there is convincing evidence that enteral nutritional support decreases septic complication when compared to total parenteral nutrition. Moore et al demonstrated a significant decrease in major infectious complications in enterally fed postoperative patients with abdominal injuries<sup>9</sup>. In present study only five patients in control group and four patients in study group had mortality because of acute respiratory distress syndrome, aspiration and multiple organ failure. Serum albumin was measured in both the groups on admission and discharge. The control group could maintain serum albumin levels whereas the study group showed an increase in serum albumin on discharge .In both the group albumin level showed that there was no nutritional depletion, rather the immuno-supplemented group improved their serum albumin level on discharge. There was a significant reduction in the average length of stay, ICU stay and days of fever in the study group who had the benefit of receiving immunonutrients. Moore et al investigated that early enteral feeding with immune enhancing formula had a reduced ICU stay and hospital length of stay in a group of patients with trauma.

**CONCLUSION**

In a clinically critical situation where the patient’s requirements for nitrogen and energy are very high we have been able to supply the optimum nutritional support in both the groups to achieve a positive nitrogen balance. Immunonutrients should be supplemented only to specific

patients with special requirements because these preparations are costly though they definitely help in reducing ICU stay, length of stay. The early enteral nutritional support with a calorie to nitrogen ratio of 90:1 in patients with head injury and polytrauma helps in achieving positive nitrogen balance and is cost effective.

**Table 1. Control Group Mean Nitrogen Balance and Serum Albumin**

Parameter	Initial Value	Final Value	p-value
Nitrogen balance	+7.51	+9.091	<0.05
Serum albumin	3.2	3	<0.05

**Table2. Study Group Mean Nitrogen Balance and Serum Albumin**

Parameter	Initial	Final	p value
Nitrogen balance	+11.9	+15.6	<0.05
Serum albumin	2.93	3.42	<0.05

**Table 3. Mean Length of Stay and ICU Stay**

Parameter	Control Group	Study Group
Los	21	18
ICU stay	4	2.4

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