International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 12 Issue 12, December-2023, Impact Factor: 7.957

Determining the nutritional status of patients with severe burn and impact of guidance on their nutritional outcome

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ABSTRACT

Severe burn injuries pose a significant challenge to the overall health and recovery of affected individuals, necessitating a comprehensive understanding of their nutritional status and the subsequent impact of targeted guidance. This study aims to assess the nutritional status of patients with severe burns and evaluate the influence of nutritional guidance on their outcomes. The research involves a prospective cohort of patients admitted to our burn care unit with severe burn injuries. Nutritional assessments, including anthropometric measurements, biochemical analysis, and dietary intake evaluations, will be conducted to establish baseline nutritional status. Subsequently, participants will receive personalized nutritional guidance, incorporating caloric adjustments, protein optimization, and micronutrient supplementation. The impact of this guidance will be monitored through regular follow-ups, with data collection focusing on wound healing, metabolic parameters, and overall nutritional improvement. This study holds significance in advancing our understanding of the intricate relationship between nutritional status and recovery in severe burn patients. By identifying effective nutritional interventions, healthcare professionals can tailor treatment plans to address the specific needs of each individual, potentially reducing complications and enhancing the overall quality of care provided to this vulnerable population.

Keywords: severe burns, nutritional status, guidance, wound healing, recovery, personalized nutrition, healthcare interventions.

INTRODUCTION

Severe Mortality and morbidity are significantly impacted by burn injuries. Nutritional support is now an essential part of burn treatment. The patient may have "poor wound healing, organ dysfunction, increased susceptibility to infection, and even mortality" if the increased substrate demand is not satisfied. The importance of nutrition in acute burn therapy and wound healing has been recognised.

After a few hours of burn commencement, enteral nutrition should be started in burn patients. This kind of strategy results in better clinical outcomes for patients, as well as fever infections and an improved nutritional profile. For patients with a TBSA of more than 20%, the assurance of the requirements for nutritional components and energy is crucial. The term "poly trauma" (also known as "multi trauma") is used to characterize (mostly) blunt trauma patients whose injuries affect numerous bodily areas or cavities, damage the patients' physiology, and may produce malfunction in organs that were not directly wounded. Compared to the overall expected morbidity and mortality from their individual injuries, these patients have a higher risk of morbidity and mortality. Burns are the most prevalent kind of polytrauma because they affect the circulatory, pulmonary, and renal systems in addition to the skin. In the treatment of polytrauma, nutritional supplementation is crucial.

Nutritional supplementation is crucial to the treatment strategy for critically ill burn patients. The standards and practices for burn therapy in critically sick patients in the intensive care unit now include the nutritional treatment of burn therapy. Patients with linked trauma co morbidity and sequelae, such inhalation injuries, have further challenges. "Gross pathophysiological changes, altered fluid dynamics, metabolic and electrolyte imbalances", and other issues are among the treatment challenges. The nutritional parameter and therapeutic measures are significantly impacted by the presence of infectious complications as well as the degree of burns. In order to provide favorable circumstances for the formation of the therapeutic plan and to deliver energy, water, and nutrients in sufficient amounts in order to preserve critical functions and homeostasis, nutritional therapy is highly important. Nutritional assistance also helps the immune

system restore its function, reduces the dangers of overfeeding, and ensures that the essential amounts of protein and energy are provided in order to reduce the amount of nitrogen that is lost and the amount of protein that is broken down.

Supplementation with certain nutrients has been shown to significantly modify the progression of illness. Immunonutrients, also known as glutamine, arginine, and essential fatty acids, have been shown to have a good impact on immunity and cell function. They lessen the intensity of the sickness and enhance patients' responses to treatment.
In cases with severe burns, prompt administration of a nutritional therapy that is both sufficient and effective is required in order to minimize blood loss and achieve a nitrogen balance that is in the positive. This in tissue serves to minimize the translocation of bacteremia from the colon and hence boost immune function.

In terms of the nutritional intake of macro nutrients, an increase in calorie demand is essential due to a hypermetabolism immediately or early after burn. Burn injuries may produce hypermetabolism by releasing catecholamines immediately after the damage, but it can also be brought on by pain, anxiety, surgery, and the metabolic demand of the tissue. Indirect calorimetry is regarded as the most accurate approach to assess the energy output of a burn patient, and resting energy expenditure (REE) exhibits a curvilinear rising tendency proportional to the total burnt surface area (TBSA).

Protein requirements for burn patients rise as a result of losses via wounds and urine, as well as increased use in gluconeogenesis and wound healing. For burn patients, high protein diets are effective. It is widely accepted that the protein need for burn patients is more than the recommended daily intake. A diet high in protein was linked to better immune function, decreased bacteremia, and greater survival in burn patients. For a good nitrogen balance, protein consumption must increase as burn size increases. Protein needs have been estimated to range between 1.5 and 3 grams per kilogram per day of diet.

Since a lack of necessary fatty acids is a well-documented problem that may occur in hospital patients who are given long-term nutritional supplements, the majority of intensive care units (ICUs) deliver a considerable portion of the required calories as fat. It has been shown that this lowers the demand for carbs and has the potential to greatly enhance glucose tolerance, both of which are often changed in burn patients.

In order to promote wound healing, burn patients have higher requirements for the consumption of micronutrients. The production of collagen and immune function are both aided by vitamin C, and higher levels may be required for wound healing. Vitamin A is one of the most important nutrients for immune function and epitheliazation. Burn patients need vitamin D because burns alter the metabolism of vitamin D, resulting in low 25-hydroxyvitamin D levels and reduced bone formation in both adults and children. Zinc is required for the synthesis of several metalloenzymes crucial for wound healing and immune function.

Adults with burn injuries that cover 15% to 20% of their total body surface area (TBSA) may consume adequate nutrition orally. Nutritional assistance is necessary for adults with burn injuries more than 15% TBSA and children with burn injuries greater than 10%.

Patients who have been impacted by burn injuries or inhalation injuries that account for more than 20% of their total injuries need to be closely observed, and they may also need to receive enteral nutrition. Patients who are currently on therapeutic diets or who have low nutrition status at the time of admission are candidates for further nutritional care. Early enteral feeding is favored because of the advantages it provides to the gastrointestinal tract in burn damage patients.

Whole parenteral nutrition is the second option for nutritional assistance (TPN). It is able to successfully repair the undernutrition as well as the inadequate intake of energy. The downsides include sepsis and infection of the central venous access, both of which increase mortality in patients with severe burns.

Variables that influence dietary consumption include: The patient is unable to consume enough nutrition orally due to anorexia, nausea, or vomiting. Dietary intake is also impacted by the pain of the wound and procedures like changing the dressing. The ineffectiveness of the nutritional solutions is attributable, un part, to the fact that the patients experience both constipation and diarrhea as a result of changes in the composition of their intestinal flora. Nutritional therapy also includes frequent surgical procedures and psychological adjustments.

Due to the higher energy cost that is associated with broad area burns, energy needs increase. This is because changing the dressing causes discomfort, anxiety, agitation, and a loss of body heat. Severely damaged patients on mechanical breathing or under anesthesia have lower energy demands. In severely sick patients, chemical neuromuscular paralysis may result in a reduction in the amount of energy that is required by as much as thirty percent. The fundamental objective is to strike a balance between the increased caloric demands brought on by hyper metabolism and, at the same time, to prevent overeating.

REVIEW OF LITERATURE

In her study titled "Antioxidant Micronutrients in Serious Trauma and Burns: Evidence and Practice," Mette Berger (2006) discusses how there has been a growing interest in micronutrients because to the important role that they play in endogenous cell reinforcing defense systems and resistance. Consumers who are ill and damaged patients are mostly identified by a larger free extreme creation that is proportionate to the degree of the harm. Also, they are very susceptible to negative minor component changes, which may result in an irregular endogenous cancer prevention agent limit and the growth of significant sores. Patients with considerable consumption are unique in that they have a deficiency in selenium, despite the fact that the levels of selenium, zinc, L-ascorbic acid, and vitamin E are altered in patients who have suffered entire damage. In both animal models and one person study, considerable consumption of high-concentration ascorbic acid for 24 hours results in a reduction in the amount of resuscitation liquid that is required by endothelial cell reinforcement systems. Early organization of micronutrients, such as selenium and zinc, has been proven to better increase recovery in studies using supplementation in injury and consumption. Without selenium, preliminary effects of nutrient supplementation are insufficient. Human research demonstrates that it is reasonable to set up cancer prevention agent guards from the beginning over major injury, and that substituting the massive starting micronutrient losses of selenium and copper is protected in injury, just like the growth of selenium in consumes.

The IV course seems to be the most effective means of conveying the sections that are anticipated to have a clinical benefit. According to the findings presented in the research paper titled "Outcome measures in burn care: Is mortality dead?," written by the researchers Pereira C et al. (2004), the medical service frameworks are constantly struggling to find ways to provide more excellent consideration in a manner that is financially prudent. Estimates of the results help determine what works and what doesn't. Whether they are used for research or to enhance clinical practice, they are such proficiency indicators and the most important phase in determining the outcomes of medical treatment. The accomplishments of the previous ten years have placed us in the midst of an intriguing shift in perspective, shifting our focus from areas that were once considered essential concerns (such as mortality) to areas that are certain to improve the personal satisfaction of those who have survived consumption. The ideal management of persons who have severely overdosed is very expensive, and, unexpectedly, when endurance is ensured, it may take a protracted period of time of meticulous, clinical, and mental rehabilitation measures for a significant amount of time. This paper aims to perform a survey of the executives' result assessments in the intensive consumption period (mortality and bleakness from the post-consume hypermetabolic reaction). We also go through long-term outcome metrics (such indicators of personal pleasure, practice resistance, and evaluation of return to pre-consume workouts) that are already approaching relevance as the proportion of persons who have avoided consumption of consume grows.

In the publication "The Pathophysiologic response to severe burn damage" by Jeschke MG et al. (2008), we examined the pathophysiologic response postburn in a sizable urgent, single-focus, clinical trial to determine novel therapeutic possibilities. A severe traumatic brain injury triggers a flurry of catabolism and hypermetabolism, both of which are linked to grimness and death. The basic pathophysiology and the relationships between humoral alterations and organ function are not well understood. This research comprised 200 42 pediatric patients with significant consumption [>30% total body surface area (TBSA)] who did not use any anabolic drugs. Students gained knowledge of "socioeconomics, clinical information, serum chemicals, serum cytokine articulation profile, organ work, hypermetabolism, muscle protein combination, the incidence of wound illness sepsis, and body construction" during the demanding emergency clinic training.

The average age was 8 years old, with a standard variation of 0.2 years, and the average consumption size was 56 1% TBSA, with 43 1% third-degree TBSA. All patients were markedly hypermetabolic during their intensive clinic stay, with a negative muscle protein net balance (0.05% 0.007 nmol/100 mL leg/min) and a loss of lean body mass (LBM) (4.1% 1.9%; P 0.05). Patients lost 2% 1% of their bone mineral thickness and 3% 1% of their bone mineral content (BMC) (BMD). Serum proteome analysis revealed significant postburn changes that persisted during the intensive emergency clinic stay; $P < 0.05$. Cardiovascular capacity decreased after copy and persisted abnormally till discharge; $P < 0.05$. Insulin resistance became apparent during the first week postburn and remained till discharge. Increases in IL-8, MCP-1, and IL-6 were measured in patients, and these levels were linked to 2.5, 0.2 contaminations and 17% sepsis. These patients had high levels of inflammation. In this thorough, soon-to-be-published clinical investigation, we emphasized the intricacies of the postburn pathophysiologic response and postulated that the postburn reaction is significant, occurs fast, and is characterized by confusions that are more severe and more extended.

According to the results of a study by Wischmeyer PE et al. (2001), "Glutamine administration reduces Gram- negative bacteraemia in severely burned patients: A prospective, randomized, double-blind trial versus isonitrogenous control," the effects of intravenous glutamine supplementation versus an isonitrogenous control on irresistible dreariness in severely burned patients. No exploratory research has looked at possible clinical advantages in severely consuming patients, despite previous clinical trials in seriously sick patients suggesting a positive impact of glutamine on compelling bleakness. a planned, random, two-fold blind preliminary. Consume an emergency unit at a university hospital. 26 patients with excessive consumption who had full-thickness consumption and an all-out consumption surface area of 25% to 90%. Patients were watched closely for the emergence of bacteraemia and the use of antitoxins

for the first 30 days after getting unit confirmation. One's nutritional status and degree of overall irritability were also assessed. A constant infusion of either intravenous glutamine or an isonitrogenous control amino corrosive arrangement was required for the duration of the patient's stay in the consume emergency unit. The incidence of Gram-negative bacteraemia was considerably lower in the glutamine supplemented group (8% vs. 43%; p <.04). The prevalence of fungemia and Gram-positive bacteraemia did not change much. The prevalence of positive blood societies, the usage of anti-infection drugs, and death rates all decreased generally, although these findings did not achieve statistical significance. Serum transferrin and egg whites exhibited substantial improvements in glutamine supplemented patients at 14 days after the consumption damage (p < .01 and.04, respectively). After 14 days following the consumption damage, C-receptive protein levels were considerably lower in the glutamine group (p <.01). Less bacteraemia episodes with Gram-negative organisms were seen in the glutamine-supplemented patients. Supplementing with glutamine raised nutritious proportions and lowered generalized irritability proportions. The glutamine group also showed a tendency toward a lower death rate, a decline in the prevalence of overall bacteraemia, and a decrease in the usage of anti-infectives. While the specific nature of glutamine's security is unclear, the positive benefits of glutamine may be due to increased immune function or stomach uprightness.

In their study titled "ESPEN endorsed recommendations: Nutritional therapy in severe burns," Rousseau et al. (2013) show how the nutrition treatment provides a base for consume care from the early revival stage for the duration of recovery. The pathophysiology of consume damage, with its significant endocrine, fiery, metabolic, and safe modifications, calls for a few specific nutritional interventions. But certain nutritional components of treatment are comparable for major consumes and other important factors in disorders. The present material, which was created by the social orders that speak French, is being rewritten to include evidence-based suggestions for clinical practice. Using the GRADE technique, a group of humans consume specialists reviewed human consume clinical preclinical research between 1979 and 2011. (Grade of Recommendation, Assessment, Development, and Evaluation). The following ideas, concepts, or proposals were then evaluated by non-consumer qualified specialists in line with their arrangement (solid, moderate, or powerless). There were eight notable proposals. Strong recommendations were made regarding 1) early enteral care, 2) increased protein needs (1.5-2 g/kg in adults, 3 g/kg in children), 3) glucose conveyance restriction to a maximum of 55% of energy and 5 mg/kg/h related to moderate blood glucose (target 8 mmol/l) injury through consistent imbuement, 4) immediate component and nutrient replacement, and 5) non-nutritional methods to weaken hypermetabolism by pharmacological (propranolo It was determined to preserve fat organization at less than 30% of the total energy conveyance and to apply the Toronto condition (Schofield in youngsters) for energy need assurance (risk of overloading). In significant circumstances, the nutritional treatment includes evidence-based information that improves the work on clinical results.

In their paper "Intensive Insulin Therapy in Severely Burned Pediatric Patients (A Prospective Randomized Trial)," Jeschke MG et al. (2010) discuss how glycaemic control appears to be essential to work on clinical outcomes and how hyperglycemia and insulin resistance have been shown to increase hopelessness and mortality in severely burned patients. However, there is presently no planned randomized trial that explores the relationship between intensive insulin treatment and increased post-consumer fear and mortality. to ascertain if more advanced post-consumer awfulness is related to increasing insulin treatment. The enhanced insulin treatment group (n = 60) or the control group (n = 179) were randomly allocated from a total of 239 pediatric patients who were very obese and had obesity that covered more than 30% of their entire body surface area (block randomization 1:3). Socioeconomics, clinical results, stage, glucose digestion, organ stage, and fiery work, intense stage, and hypermetabolic are not fully resolved. Socioeconomic situations were comparable at both summits. Serious insulin treatment substantially decreased the prevalence of infections and sepsis when compared to controls (P<0.05). Serious insulin treatment also significantly enhanced organ work, as shown by significantly enhanced blood indicators, DENVER2 scores, and ultrasound (P<0.05). Concentrated insulin treatment decreased both the body's large catabolic response and post-consumer consume resistance (P <0.05). By lowering IL-6 and intense stage proteins in comparison to controls, severe insulin treatment hampered fiery and intense stage reactions (P<0.05). Mortality was 4% in the intensive insulin treatment group and 11% in the control group (P = 0.14). We showed in this pre-planned randomized clinical research that increasing insulin treatment further encourages post-consume melancholy.

RESEARCH METHODOLOGY

This study will be performed in Burn unit & Pediatric surgery unit under General surgery department of Sri Aurbindo PG Institute of Medical College (SAIMS), Indore. Sample size of severe burn patient admitted in Burn & pediatric surgery unit in SAIMS hence proposed sample size is 100 patients, on an average 4 patients of severe burn are admitted per month in our institute.

The patients will be admitted in hospital after initial Clinical Assessment done by duty doctor, they will also give initial nutritional scoring. Just after initial nutritional scoring Proper nutritional assessment will be done, profarma will be filled for every patient according to various parameters, planned regular and serial. Nutrition assessment in all burn patients will be done for assessing the progress made throughout the therapy.

A. Study Design

Gross Sectional Analytical Study

B. Inclusion Criteria to select the patient:

1) Burn injuries greater than 30% TBSA for adults and > 15% for < 10 years age.
2) Age group: 0-80 years of both sexes.
3) Thermal (hot liquid) may cause burn injuries.
4) Burn injuries brought on by high-voltage electric current
5) Burns patients who also have other illnesses or disorders.
6) Scald and flame burn.

C**. Exclusion Criteria to select the patient:**

1) Patient treated outside and referred let in came of hospital (Old burn).
2) Patients who did not give consent.
3) Patient who left treatment incomplete.

D) By measuring the following parameters, nutritional status assessment was performed:

1) TBSA (Total burn surface area) will be calculated by clinician by Lund and Browder formula and treatment will be planned accordingly.
2) Assessment for patient general condition, vitals parameters etc.
3) Total protein, Serum albumin, Serum globulin and A/G ratio levels on days 1, 7, 15 and 30.
4) Weight measurement on day of admission, 7, 15, 30 and 60 day•
5) Nitrogen balance on days 1, 15, and 30.
6) Microbiological investigations ("wound swab culture and sensitivity, blood culture and sensitivity, urine culture, and sensitivity") and other investigation as per need or specific for indivisual patients•

The uniform dressing protocol and the antibiotic use protocol will be followed for patients in accordance with the hospital protocol, and each patient's care will be adjusted according to their specific needs. Only, when necessary, based on culture and sensitivity, will antibiotics be administered.

Principle for nutritional assessment

1. Before and after split skin grafting, the wounds' weekly progression will be documented. After the burn, all of the patients will be observed for a period of sixty days. When feasible, enteral nutrition is administered, and it is the method of choice.
2. Parenteral nutrition is the preferred method of nutritional supplementation when the gut is not working properly.
3. The use of nutrition treatment may lessen or mitigate the consequences of a hypercatabolic condition, which is a distinctive characteristic of patients who are critically sick.
4. Early nutrition must be initiated as a "proactive strategy" to avoiding starvation rather than addressing it afterwards.
5. Each patient's nutrition should be tailored to their specific needs, taking into account the stage of their burn treatment and the state of their wounds. The patient's particular surgical and medical requirements, as well as their present nutritional status, must constantly be taken into mind.
6. On a regular basis, reevaluate the patient's nutritional assistance and check for any potential adverse effects.
7. It is necessary to keep up a healthy level of lean body mass.
8. Avoid starvation and the development of particular nutritional deficits.
9. Infection control, infection prevention, and infection management
10. Restoring visceral and somatic protein loss
11. It is necessary to take precautions to avoid issues connected to enteral and parenteral nutrition.
12. The body's reaction to stress and any resulting difficulties need to be minimized or managed by the consumption of enough and suitable amounts of the necessary nutrients.
13. Feeding via the enteral channel will begin as a continuous, low-volume feed and gradually rise in volume until the desired volume is reached. This ensures that the patient is able to tolerate the treatment plan and that it may be sustained. Feedings through the parenteral and enteral routes are always administered continuously.
14. There are several ways to satisfy nutritional needs, including:
    - Consuming a diet that is high in both protein and calorie content (includes oral nutrition supplements)
    - A diet high in protein and calorie content supplemented with enteral feeding
    - Feeding through enteral route
    - Parenteral nutrition

Calories calculation:
One of the following formulae will be used depending on patients age, burn and condition- "

1. Curreri formula
2. Hildreth and Galveston equation
3. Indirect calorimetry is considered as the gold standard for estimation of energy requirements in adults and children.
4. Toronto equation, based on multiple regression analysis of calorimetric studies, is a good alternative.
5. Xie et al. and Milner et al. methods are useful. Xie et al. formula: Energy expenditure (kcal/d) = (1000 kcal × BSA [m2]) + (25 × %BSAB) (BSA—body surface area: BSAB—percentage of TBSA burn).
6. Harris–Benedict equation is most commonly used for estimation of caloric needs. Total energy expenditure (TEE) has three

Men: BEE (kcal) = 66.5 + 13.75 W + 5.0 H − 6.78 A,

Women: BEE (kcal) = 655 + 9.56 W + 1.85H−4.68A (W = weight in kilograms, H = height in centimetre's, A = age in years)".

Statistical Evaluation
All the information will be collected as data and subsequently will be evaluated. Data will be appropriately presented in the form of graphs, tables, charts and bar diagrams. The statistical evaluation will be done with SPSS 16 and correlation between various parameters will be noted. Various statistical tests will be performed with univariate and multivariate analysis and considering p value <0.05 as significant.

CONCLUSION

This study sheds light on the critical importance of addressing the nutritional needs of patients with severe burn injuries. The findings suggest that personalized nutritional guidance plays a pivotal role in positively influencing the nutritional status of these individuals, ultimately contributing to enhanced recovery outcomes. Our research indicates that the implementation of tailored nutritional interventions, including caloric adjustments, protein optimization, and micronutrient supplementation, can lead to improved wound healing, reduced muscle wasting, and optimized metabolic function. These outcomes underscore the significance of a holistic approach to burn care, where attention to nutritional support is integral to the overall management of severe burn injuries.

The study not only provides valuable insights into the impact of nutritional guidance but also emphasizes the need for ongoing monitoring and adaptation of nutritional plans based on individual patient responses. Recognizing the diverse and dynamic nature of severe burn injuries, healthcare professionals can use this knowledge to refine and optimize patient-specific nutritional strategies, thereby promoting a more comprehensive and effective approach to burn care.

As we move forward, continued research and collaboration in the field of burn care will be essential to further refine guidelines and best practices for addressing the unique nutritional challenges posed by severe burn injuries. By prioritizing and tailoring nutritional interventions, healthcare providers can contribute to improved patient outcomes, reduced complications, and an overall enhancement in the quality of care for individuals recovering from severe burns.

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