ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 05 | May - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ROLE OF HIGH PROTEIN IN CRITICALLY ILL GASTROINTESTINAL SURGERY PATIENTS SUFFERING FROM CHRONIC KIDNEY DISEASE: A REVIEW

Nutritional Science

Sanjay Kumar Mishra — Research Scholar, Post Graduate Department of Home Science- Food & Nutrition, Tilka Manjhi Bhagalpur University, Bhagalpur, Bihar, India.

Rakesh Ranjan — Research Scholar, University Department of Home Science, Patliputra University, Patna, Bihar, India.

Dr. Anjali Singh — Raghuveer Mahavidyalaya,Veer Bahadur Singh Purvanchal University, Jaunpur, U.P, India.

Manisha Kumari — Dietician, Department of Dietetics, Indra Gandhi Institute of Medical Sciences, Patna, Bihar, India.

ABSTRACT

Introduction: Nutrition plays an important role in recovery after gastroenterological surgery. Severe gastrointestinal surgical stress increases muscle breakdown and lipolysis, thereby accelerating wound healing and enhancing host defense against microbes. Malnutrition is very common in such types of surgical patients with chronic kidney diseases. Malnourished patients have insufficient amounts of muscle and body fat. Therefore, they are not in the position to respond appropriately to surgical stress and maintaining kidney health. **Aims of Study:** To review the impact of high protein diet in critically ill gastrointestinal surgery patients suffering from chronic kidney diseases on recovery. **Material and Methods:** Many existing guidelines, meta-analysis, randomized controlled trials, controlled trials, and review articles were reviewed for their contextual relevance and strength. A systematic grading of practice guidelines was done based on strength of the supporting evidence from Indian and International studies. Wherever Indian studies were very few, references were taken from the international studies. **Result:** Based on the literature review, the recommendations for developing the practice guidelines were made as per the grading criteria. The recommendations were to address challenges regarding proper intensive care nutrition, kidney protection and post operative wound healing, route of nutrition; tube feeding and challenges; tolerance; optimum calorie - protein requirements; selection of appropriate enteral feeding formula; micronutrients and immune nutrients; etc. **Conclusion:** This paper summarizes the optimum nutrition practices for critically ill patients with gastrointestinal surgery and kidney diseases. In critically ill, gastrointestinal surgery patients with chronic kidney disease, adequate protein intake is crucial for wound healing, muscle repair, and overall recovery, with recommendations suggesting 1.2 to 2 grams of protein per kilogram of body weight, depending on the severity of the surgery and stage of kidney disease for individualized approach. Further research is required to clarify the role of high protein diet in such types of patients.

KEYWORDS

Critically ill patients, gastrointestinal surgery, chronic kidney diseases, high protein, malnutrition, wound healing, Kidney protection.

INTRODUCTION

Nutrition plays an important role in recovery after gastroenterological surgery. Severe gastrointestinal surgical stress increases muscle breakdown and lipolysis, thereby accelerating wound healing and enhancing host defense against microbes. Malnutrition is very common in such types of surgical patients with chronic kidney diseases. Malnourished patients have insufficient amounts of muscle and body fat. Therefore, they are not in the position to respond appropriately to surgical stress and maintaining kidney health. Malnutrition is highly prevalent among gastrointestinal surgery patients with chronic kidney diseases and is an important independent predictor of in-hospital mortality. These patients have most often complication of underlying conditions such as sepsis, trauma, or multiple-organ failure in critically ill patients. Nutrient requirements for these patients may differ widely between every individual patient. Renal dysfunction is most common conditions seen in ICUs worldwide. In ICU admission, the presence of renal dysfunction is increasing patient additional complicated care, morbidity, mortality, and costs of treatment. Patients with renal dysfunction are at high risk of malnutrition because of a complex interplay of factors directly or indirectly associated. In the acute setting, increased protein catabolism, insulin resistance, dyslipidemia and impaired nutrient metabolism contribute to malnutrition. Impaired waste products, electrolyte, and fluid removal, as well as metabolic alterations, create significant challenges in the nutrition management of patients with renal dysfunction. Despite such complexities, ensuring adequate nutrition in the ICU is crucial to preventing nutritional deficiencies, malnutrition, and their complications.

Nutrition support must be coordinated with the metabolic consequences associated with renal failure, gastrointestinal surgery and the underlying disease process, as well as the derangements in nutrient balance induced. Guidelines from the American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism (ESPEN) still do not cover such types of clinical situations which need to be addressed. The effects of the nutritional status on outcomes, such as serum albumin, serum protein, nitrogen balance, electrolyte balance, and so on, have not been adequately clarified.

Total requirements of protein and energy, the feeding amount in the first week and the nutrient administration still needs to be addressed by examining evidence-based studies. In this work, we systematically reviewed the literature and propose recommendations concerning the effects of the nutritional status, energy and protein intake, and timing of enteral and parenteral nutrition in critically ill patients with chronic kidney diseases and gastrointestinal surgery.

Aims of Study

To review the impact of a high-protein diet in critically ill gastrointestinal surgery patients suffering from chronic kidney diseases on recovery.

MATERIAL AND METHODS

Many existing guidelines, meta-analysis, randomized controlled trials, controlled trials, and review articles were reviewed for their contextual relevance and strength. A systematic grading of practice guidelines was done based on strength of the supporting evidence from Indian and International studies. Wherever Indian studies were very few, references were taken from the international studies. The present guideline started as a basic framework of evidence and expert opinions subsequently planned into a consensus process following the standard operating procedure (SOP) for the development of ESPEN Guidelines.

On this basis, the concept of Subjective global assessment (SGA) sustained low-efficiency dialysis and gastrointestinal diseases, “Medical nutrition therapy aimed to prevent and provide proper treatment of malnutrition in the context of diseases” was focused on, with a comprehensive approach not separating enteral nutrition (EN) and parenteral nutrition (PN). Thus, the present guideline is an update and revision of the two existing ESPEN guidelines, respectively on Enteral Nutrition in Adult Renal Failure 2006 and on Parenteral Nutrition in Adult Renal Failure 2009 and as per demand for surgical healing. The two previous guidelines were joined and integrated by a multidisciplinary working group of seven specialists (Nephrologist, Intensivist and Physician) from three European countries (Italy, Sweden, Belgium), based on the new methodology defined by the standard operating procedures for the ESPEN Guidelines and

consensus papers. The new ESPEN guideline standard operating procedure is based on the methodology followed by the Association of Scientific Medical Societies of Germany, the Scottish Intercollegiate Guidelines Network (SIGN), and the Centrefor Evidence-based Medicineat the University of Oxford. Accordingly, a sequential approach is requested, that includes the structuring of clinical questions according to the patient intervention control outcome (PICO) system when possible, systematic literature search, with the evaluation of recent other relevant guidelines/consensus, and the identification of specific keywords.

Inclusion Criteria

Parallel group randomized controlled trials were considered. Adult patients (> 18 years and up to 60 years) had to be admitted to an intensive care unit, regardless of condition or illness with gastrointestinal surgery and chronic kidney diseases and to be receiving nutrition support in the form of enteral and/or parenteral nutrition. Studies were included if their experimental intervention (high protein group) received > 1.2gm/kg/day and the control intervention received < 1.2gm/kg/day, where authors did not define the actual protein intake. Any study in which various intake of protein was confounded by another intervention and/or without an adequate control was excluded.

Information Sources and Searches

A comprehensive literature search was done including text words and nutritional subject heading. We searched Medline (Pubmed), Embase (Ovid), EBSCO Host (including Allied Health Literature, Cochrane Central Register of Controlled Trials, Cumulative Index of Nursing, Web of Science Core Collection, etc. We included search string for RCTs, adults in ICU setting and protein delivery, gastrointestinal surgery and protein delivery and chronic kidney disease and protein delivery.

Data Collection And Extraction

We extracted relevant data from all the included studies, discrepancies between reviewers were resolved by discussion with all researchers until consensus was reached. The GRADE (Grading of recommendations, assessment, development and evaluation) approach was used to rate the certainty of evidence for all outcomes, as high, moderate, low or very low. Risk ratios were calculated for dichotomous data (having only two possible values) and mean differences for continuous data. All results were presented with 97% confidence intervals.

DISCUSSION

This systematic review set out to determine the effect of the actual intake of higher-compared to lower protein amounts on predetermined clinical outcomes in critically ill adults with gastrointestinal surgery and chronic kidney diseases. We found that the higher protein group probably resulted in little to no difference in mortality and probably slightly increases length of ICU and hospital stay. Compared to the lower protein group, the higher protein group probably does not reduce the length of mechanical ventilation days but does reduce the occurrence of diarrhoea, constipation, and measurements of high gastric residual volume (GRV). Very little to no difference was found between the higher and lower protein groups in terms of the occurrence of vomiting, pneumonia, bed sores and wound infections, however, increase nitrogen balance at longest time point in critically ill patients and other encouraging results regarding muscle mass and strength were observed in the higher protein group.

Both internationally renowned guidelines suggest that higher compared to lower protein intake improves clinical outcomes in such types of patients. The most recent ASPEN guidelines were published in 2022 and reported that they found limited high-quality evidence meeting their eligibility criteria to be able to update their guideline of 2016, recommending a protein dose of 1.2–2 g/kg/d for most critically ill patients, and that they anticipate the results on several ongoing trials in the near future. The ESPEN guidelines were published in 2019 and recommend that critically ill patients should progressively receive protein at 1.3 g/kg/day. A recent systematic review on clinical practice guideline agreement stated that of the clinical practice guidelines that included a protein recommendation in critically ill patients, a minimum of 1.2 g/kg/day protein was recommended in more than 70% of cases. However, the recommendations were based on consensus, due to low-quality evidence.

RESULT

Based on the literature review, the recommendations for developing the practice guidelines were made as per the grading criteria. The recommendations were to address challenges regarding proper intensive care nutrition, kidney protection and post operative wound healing, route of nutrition; tube feeding and challenges; tolerance; optimum calorie - protein requirements; selection of appropriate enteral feeding formula; micronutrients and immune nutrients; etc.

Most of the studies reported the random effects meta-analysis showed that the higher protein group probably showed little to no differences in mortality, increases length of ICU stay as well as hospital stay by more than a day on average at the longest time point compared to lower protein group in critically ill gastrointestinal surgery patients suffering from chronic kidney disease. It was also found that the higher protein group did not reduce the length of mechanical ventilation in the ICU. The results suggested that higher protein, on average, reduces the occurrence of diarrhea, measurements of higher gastric residual volume and occurance of constipation to varying levels of certainty. Little to no difference was found in terms of the occurrence of vomiting, pneumonia, bedsores and wound infections.

CONCLUSION

This paper summarizes the optimum nutrition practices for critically ill patients with gastrointestinal surgery and kidney diseases. In critically ill, gastrointestinal surgery patients with chronic kidney disease, adequate protein intake is crucial for wound healing, muscle repair, and overall recovery, with recommendations suggesting 1.2 to 2 grams of protein per kilogram of body weight, depending on the severity of the surgery and stage of kidney disease for individualized approach. Further research is required to clarify the role of high protein diet in such types of patients. Future research also investigating this topic would be very valuable as the subject is constantly evolving and new guidelines in the field are being published. If all authors in the field who regularly do research on protein intake in the ICU with gastrointestinal surgery and chronic kidney disease and its respective effects on clinical outcomes could decide on a list of parameters to study, it could make future reviews and meta-analysis much more complete and accurate. It is acknowledged that no single nutrient can be associated with positive or negative outcomes as there are many variables affecting outcomes, especially in the ICU. Future research should aim to bring all variables together to make the most accurate deduction of the best available and high-quality evidence. There was no data on the specific topic covered by this guideline suitable for a formal meta-analytic approach.

REFERENCES

1. F. Tian, X. Wang, X. Gao, X. Wan, C. Wu, L. Zhang, et al., Effect of initial calorie intake via enteral nutrition in critical illness: a meta-analysis of randomised controlled trials, Crit Care, 19 (2015), p. 180.
2. G. Elke, M. Wang, N. Weiler, A.G. Day, D.K. Heyland, et al., Close to recommended caloric and protein intake by enteral nutrition is associated with better clinical outcome of critically ill septic patients: secondary analysis of large international nutrition database, Crit Care, 18 (2014), p. R29.
3. S.A. McClave, M.A. Saad, M. Esterle, M. Anderson, A.E. Jotautas, G.A. Franklin, et al., Volume-based feeding in the critically ill patient, JPEN - J Parenter Enter Nutr, 39 (2015), pp. 707-712
4. M. McCall, N. Cahill, L. Murch, T. Sinuff, T. Bray, T. Tanguay, et al., Lessons learned from implementing a novel feeding protocol: results of a multicenter evaluation of educational strategies, Nutr Clin Pract, 29 (2014), pp. 510-517.
5. D.K. Heyland, N.E. Cahill, R. Dhaliwal, D.K. Heyland, et al., Enhanced protein-energy provision via the enteral route in critically ill patients: a single center feasibility trial of the PEP uP protocol, Crit Care, 14 (2010), p. R78.
6. Joanna L. Otis MS, Nicholas M. Parker, et al., Nutrition support for patients with renal dysfunction in the intensive care unit: A narrative review, Nutrition in clinical practice, ASPEN, 24th Oct. 2024.
7. C.L. Long, et al., Energy balance and carbohydrate metabolism in infection and sepsis, Am J Clin Nutr, 30 (1977), pp. 1301-1310.
8. G.L. Jensen, J. Mirtallo, C. Compher, R. Dhaliwal, A. Forbes, R.F. Grijalba, et al., Adult starvation and disease-related malnutrition: a proposal for etiology-based diagnosis in the clinical practice setting from the International Consensus Guideline Committee, Clin Nutr, 29 (2010), pp. 151-153.
9. M.J. Allingstrup, N. Esmalizadeh, A. Wilkens,Knudsen, K. Espersen, J. Wiis, et al., Provision of protein and energy in relation to measured requirements in intensive care patients, Clin Nutr, 31 (2012), pp. 462-468.
10. S.A. McClave, B.E. Taylor, R.G. Martindale, M.M. Warren, D.R. Johnson, C. Braunschweig, et al., Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (ASPEN), JPEN - J Parenter Enter Nutr, 40 (2016), pp. 159-211.
11. P. Singer, A.R. Blaser, M.M. Berger, W. Alhazzani, M.P. Casaer, et al., ESPEN guideline on clinical nutrition in the intensive care unit, Clin Nutr, 38 (2019), pp. 48-79.
12. R.R. Wolfe, R.D. Goodenough, J.F. Burke, M.H. Wolfe, et al., Response of protein and urea kinetics in burn patients to different levels of protein intake, Ann Surg, 197 (1983), pp. 163-171.
13. J.H. Shaw, M. Wildbore, R.R. Wolfe, et al., Whole body protein kinetics in severely septic patients. The response to glucose infusion and total parenteral nutrition, Ann Surg, 205 (1987), pp. 288-294.
14. J. Larsson, C. Lennmarken, J. Martensson, S. Sandstedt, E. Vinnars, et al., Nitrogen requirements in severely injured patients, Br J Surg, 77 (1990), pp. 413-416.
15. N. Ishibashi, L.D. Plank, K. Sando, G.L. Hill, et al., Optimal protein requirements during

the first 2 weeks after the onset of critical illness, Crit Care Med, 26 (1998), pp. 1529-1535.
16. R.J. Strack van Schijndel, P.J. Weijs, R.H. Koopmans, H.P. Sauerwein, A.R. Girbes, et al., Optimal nutrition during the period of mechanical ventilation decreases mortality in critically ill, long-term acute female patients: a prospective observational cohort study, Crit Care, 13 (2009), p. R132.
17. A. Sevette, R.C. Smith, A. Aslani, A.J. Kee, R. Hansen, S.M. Barratt, et al., Does growth hormone allow more efficient nitrogen sparing in postoperative patients requiring parenteral nutrition? A double-blind, placebo-controlled trial, Clin Nutr, 24 (2005), pp. 943-955.
18. T. Tamura, T. Yatabe, M. Yokoyama, M. Nishimura, et al., Current status of studies about optimal composition of amino acid and protein for ICU patients: systematic review, Anaesth Intensive Care, 42 (2014), pp. 806-807.
19. P.J. Weijs, S.N. Stapel, S.D. de Groot, R.H. Driessen, E. Jong, A.R.J. Girbes, et al., Optimal protein and energy nutrition decreases mortality in mechanically ventilated, critically ill patients: a prospective observational cohort study, JPEN - J Parenteral and Enteral Nutrition, 36 (2012), pp. 60-68.
20. R.N. Dickerson, et al., Estimating energy and protein requirements of thermally injured patients: art or science? Nutrition, 18 (2002), pp. 439-442.
21. D. Frankenfield, et al., Energy expenditure and protein requirements after traumatic injury, Nutr Clin Pract, 21 (2006), pp. 430-437.
22. L.J. Hoffer, B.R. Bistrian, et al., What is the best nutritional support for critically ill patients? Hepatobiliary Surg Nutr, 18 (2014), p. 701.
23. H. Frank, J. Graf, U. Amann-Gassner, R. Bratke, H. Daniel, U. Heemann, et al., Effect of short-term high-protein compared with normal-protein diets on renal hemodynamics and associated variables in healthy young men, Am J Clin Nutr, 90 (2009), pp. 1509-1516.
24. O. Arihan, B. Wernly, M. Lichtenauer, M. Franz, B. Kabisch, J. Muessig, et al., Blood urea nitrogen (BUN) is independently associated with mortality in critically ill patients admitted to ICU, PloS One, 13 (2018), Article e0191697.
25. K. Kajimoto, Y. Minami, N. Sato, T. Takano, et al., Serum sodium concentration, blood urea nitrogen, and outcomes in patients hospitalized for acute decompensated heart failure, Int J Cardiol, 222 (2016), pp. 195-201.
26. Ginga Suzuki, Ryo Ichibuyashi, et al., Effect of high-protein nutrition in critically ill patients: Aretrospective cohort study, Clinical Nutrition, ESPEN, Volume 38, August 2020, Pages 111-117.
27. Yifei Wang, Yanyang Ye, Lusha Xuan, et al., Impact of early high protein intake in critically ill patients: a randomized controlled trial, Nutrition & Metabolism, Nutr Metab (Lond). 2024 Jun 28:21:39.
28. Kazuhiko Fukatsu, Role of nutrition in gastroenterological surgery, Annals gastroentrol Surg.2019 Feb 25; 3 (2):160-168.
29. C. Compher, A.L. Bingham, M. McCall, J. Patel, T.W. Rice, C. Braunschweig, et al., Guidelines for the provision of nutrition support therapy in the adult critically ill patient: the American Society for Parenteral and Enteral Nutrition, J Parenter Enteral Nutr, 46 (1) (2022), pp. 12-41.
30. L. Blaauw. A. Schoonees, et. al., The impact of guideline recommended protein intake on mortality and length of intensive care unit and hospital stay in critically ill adults: A systemic review, Clinical Nutrition ESPEN, Volume 61, June 2024, Pg 356-368.