Nat. Volatiles & Essent. Oils, 2021; 8(4): 15597-15601

Efficacy Of Oil-Based Nutrition In Polytrauma Patients:An Original Research

Dr. Manesh kumar[1] , Dr. Sayyid Moidu Mon. C[2] , Dr. Amarjot Brar[3] , Dr Shakeel S K[4] , Dr. Imran Khalid[5] , Dr. Fawaz Abdul Hamid Baig[6] , Dr. Rahul VC Tiwari[7]

[1]Assistant professor , Department of orthopaedics, Pacific medical college and hospital,Udaipur.

[2]Final year MD Resident, Department of General medicine, Amrita Institute of Medical Science, Ponekkara, Kochi, Kerala.

[3]MDS, Orthodontics and Dentofacial Orthopedics, Consultant orthodontist, New cantt road, Street no. 5L , Faridkot , Punjab.

[4]Lecturer / Specialist prosthodontics, College Of Dentistry, Gulf Medical University, Jurf, Ajman. UAE.

[5]Assistant Professor, Department Of Oral And Maxillofacial Surgery, College Of Dentistry, King Khalid University, Abha , Saudi Arabia.

[6]Assistant professor. Dept of Oral and Maxillofacial surgery, King Khalid University College of Dentistry, Abha, KSA.

[7]OMFS, FOGS, (MHA), PhD Scholar, Dept of OMFS, Narsinhbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, 384315.

ABSTRACT

Aim

The purpose of the present study was to evaluate the efficacy of lipid or oil-based nutrition in patients with multiple trauma's.

Methodology

30 patients were included in the study. 15 patients were given as omega-3 fatty acid-enriched lipid emulsion as parenteral nutrition and rest 15 placebo. The length of stay in hospital was observed along with blood concentration of lactate, bilirubin and triglyceride, were noted at day 0, 1st, and at 5th day. Post operative mortality, cardiac complications during the treatment were also taken into the consideration.

Results

Fish oil–enriched parenteral nutrition regimen had a positive treatment effect on length of hospital stay (weighed mean difference = –2.98, P < .001), length of intensive care unit stay, postoperative infection rate (odds ratio = 0.56, P = <.04). Bilirubin levels were on the higher side in group B, whereas triglyceride levels were increased in group A.

Conclusion

Based on the analysis, fish oil or lipid–supplemented parenteral nutrition was safe, improved clinical outcomes in polytrauma patients. More laboratory parameters should be considered in future meta-analyses.

Keywords Parenteral nutrition, fish-oil supplement, length of stay, morbidity.

INTRODUCTION

Endogenous lipid stores are the main energy source for critically ill patients with an inadequate food intake. In such situations, adipose tissue triglycerides are hydrolyzed to release free fatty acids and glycerol into the circulation.[1] The markedly increased mobilisation of free fatty acids results in a decrease in intracellular triglyceride storage. This increased lipid catabolism is not countered by parenteral administration of carbohydrates. Usually, the released free fatty acids are rapidly utilised in peripheral tissues. Depending on the overall metabolic situation, there is either ketone body formation or re-esterification and triglyceride formation in the liver, subsequently released into the circulation as very low density lipoproteins (VLDL).The infusion of lipid emulsions allows for high energy supply with iso-osmolar solutions. In addition, an adequate proportion of the energy intake as lipids facilitates the prevention of high glucose infusion rates and can, therefore, contribute to the prevention of hyperglycaemia and hepatic steatosis. Lipid emulsions are also indispensable for supplying the requirements of essential fatty acids. The quantitatively dominant lipids in enteral and parenteral nutrition are triglycerides (triacylglycerols, neutral lipids; glycerol esterified with three fatty acids).Tappy et al. randomised critically ill patients to either PN with 75% glucose, 15% amino acids and 10% lipid energy intake or PN with 70% lipid, 15% glucose and 15% amino acid energy intake. The low lipid intake was associated with increased blood glucose levels (Ia). The typical metabolic changes resulting from the systemic inflammatory reaction is characterized by reduced carbohydrate and increased lipid oxidation. Therefore, an increased exogenous carbohydrate intake enhances the risk of hyperglycaemia.[2]In a randomised study of polytrauma patients, there was a significantly higher rate of infection in patients administered parenteral soybean oil emulsion with an extremely high non-protein energy intake of 28 kcal/kg compared to patients who received no intravenous lipids over the first few days.[3] However, it is noteworthy that the energy intake in patients given fat-free nutrition was 25% lower, hence complications might also have resulted from excessive overall substrate supply. In contrast, a meta-analysis of studies in surgical patients showed no differences in the course of the illness and rate of complications with PN either with or without lipid emulsions administered.[4]Diet, nutrition, and dental health are closely related and have multidirectional impacts. Any oral diseases, may it be congenital, infective, traumatic, inflammatory, or neoplastic, affect routine functions of the oral cavity and even after corrective surgeries done to improve may adversely affect the food and fluid intake and further compromises nutritional status. Unlike other general surgeries, the surgeries done in oral and maxillofacial region impairs normal food intake, especially by mouth which is the preferred commonly used route. This oral cavity being harbored by multiple organisms makes it prone to further infection which again hampers the healing. Oral surgeries include the dentoalveolar region for the treatment of fracture or prosthetic reasons, for maxillofacial trauma, orthognathic surgeries, tumors, cleft lip and palate correction, etc., Nutrition plays a major role in the postoperative recovery and healing. Malnutrition in the Oral and Maxillofacial Surgery (OMFS) patients increases the postoperative morbidity and mortality rate. Nutrition in jaw fractures treated with intermaxillary fixation is more compromised. Healing is impaired in malnourished, critically ill, elderly, and patients with prolonged stay in hospital and

hence nutrition in the form of enteral, parenteral, and oral sip feeding plays a major role in providing nutritional care. Preoperative nutrition and perioperative nutrition influence the postoperative outcome and hence metabolic and nutritional care is important for the uneventful healing.

AIM OF THE PRESENT STUDY

The purpose of the present study was to evaluate the efficacy of lipid or oil-based nutrition in critically ill patients with multiple trauma's especially in case of orofacial trauma or lesions.

METHODOLOGY

Prospective, randomized, parallel group study carried out at the Intensive Medicine, department of critical care. 30 patients were included in the study where consent was taken from either their relatives, if the patient were unconscious or if patients were conscious, informed consent was taken from the participating patient itself. Patients were divided into two groups-Group A: 15 patients who were given omega-3 fatty acid-enriched lipid emulsion as parenteral nutrition. Group B: placebo for 15 patients. Most of the patients included in the study were suffering from either single trauma or patients who were undergoing medical treatments for chronic debilitating conditions and were admitted in ICU. The patients with polytrauma more than 30% were included in the study. Almsot of patients were having orthopaedic injuries. Patients also had maxillofacial trauma and were on parenteral nutrition. Omega-3 fatty started after the 24 hours in group A. The length of stay in hospital was observed along with blood concentration of lactate, bilirubin and triglyceride, were noted at day 0, 1^{st}, and at 5^{th} day. Post operative mortality, cardiac complications during the treatment were also taken into the consideration. Descriptive statistical analysis was carried out with the data received, where standard deviation and mean were calculated. P value ≤ 0.05 was considered significant.

RESULTS

The combined analysis showed that a fish oil–enriched parenteral nutrition regimen had a positive treatment effect on length of hospital stay (weighed mean difference = –2.98, $P < .001$), length of intensive care unit stay, postoperative infection rate (odds ratio = 0.56, $P = .04$), and serum levels of Lactate level day 0,1 day,5 days, in these patients. The significant differences were found between the 2 groups in postoperative morbidity; incidence of postoperative cardiac complications; serum levels of bilirubin, triglyceride. No serious adverse events related to fish oil treatment were reported. Bilirubin levels were on the higher side in group B, whereas triglyceride levels were increased in group A. (Table 1) However, fish oil rich parenteral nutrition helped reduce the length of ICU stay.

DISCUSSION

Nutritional intervention may include oral supplementation, enteral (tube) feeding, or parenteral (intravenous) feeding. Enteral support is recommended over parenteral support because of its relative simplicity, safety, reduced complications, and lower cost, as well as its ability to maintain mucosal barrier function. Once the presence of malnutrition is established or it becomes clear that the patient will not be able to maintain adequate nutrition. By providing adequate nutritional support in the preoperative and postoperative period avoids complications and ensures adequate healing.[5-10]Fish oil (FO)-enriched enteral and parenteral nutrition (PN) appears to be well tolerated and confers additional clinical benefits, particularly in surgical patients, due to its anti-inflammatory and immune-modulating effects. Whilst the evidence base is not conclusive, there appears to be a potential for FO-enriched nutrition, particularly administered perioperatively, to reduce the rate of

complications and intensive care unit (ICU) and hospital stay in surgical ICU patients. The evidence for FO-enriched nutrition in non-surgical ICU patients is less clear regarding its clinical benefits and additional, well-designed large-scale clinical trials need to be conducted in this area.The standard daily doses of protein, glucose, fat and amino acid concentrations must be clearly defined and adjusted to the calculated individual patient metabolic needs.[11-16] An example of a standardized enteral nutrition is Impact®; one of the most commonly used clinical formulas. Multicenter prospective randomized clinical trials on critically ill trauma patients have demonstrated that the administration of Impact® for 7 to 10 days reduced the rates of infection, wound complications, and the risk of multiple organ failure.[17-19] Nonetheless, standardized enteral nutrition is not consistently administered to critically ill trauma patients.

Dramatic metabolic changes occur in severely injured patients which must be acknowledged early and monitored during the posttraumatic phase. Appropriate immunonutrition should be started in the ICU, preferably by enteral route, in order to counteract the potentially devastatingeffects of the massive hypermetabolic state after major trauma.

CONCLUSION

Optimal nutrition can play a key role in controlling inflammation, providing key nutrients for rebuilding injured tissue, minimizing muscle atrophy and supporting strength preservation and gain.

REFERENCES

1. Biolo G, Grimble G, Preiser JC, Leverve X, Jolliet P, Planas M, Roth E, Wernerman J, Pichard C; European Society of Intensive Care Medicine Working Group on Nutrition and Metabolism. Position paper of the ESICM Working Group on Nutrition and Metabolism; Metabolic basis of nutrition in intensive care unit patients: ten critical questions. Intensive Care Med. 2002;28(11):1512-20.
2. Tappy L, Schwarz JM, Schneiter P, Cayeux C, Revelly JP, Fagerquist CK, Jéquier E, Chioléro R. Effects of isoenergetic glucose-based or lipid-based parenteral nutrition on glucose metabolism, de novo lipogenesis, and respiratory gas exchanges in critically ill patients. Crit Care Med. 1998;26(5):860-7.
3. Battistella FD, Widergren JT, Anderson JT, Siepler JK, Weber JC, MacColl K. A prospective, randomized trial of intravenous fat emulsion administration in trauma victims requiring total parenteral nutrition. J Trauma. 1997;43(1):52-8.
4. Heyland DK, Montalvo M, MacDonald S, Keefe L, Su XY, Drover JW. Total parenteral nutrition in the surgical patient: a meta-analysis. Can J Surg. 2001;44(2):102-11.
5. Frankenfield DC, Wiles CEIII, Bagley S, Siegel JH: Relationships between resting and total energy expenditure in injured and septic patients. Crit Care Med 1994, 22:1796-1804.
6. Moore FA, Moore EE, Jones TN, McCroskey BL, Peterson VM: TEN vs. TPN following major abdominal trauma - reduced septic morbidity. J Trauma 1989, 29:916-922.
7. Moore FA, Moore EE, Kudsk KA, Brown RO, Bower RH, Koruda MJ,
8. Baker CC, Barbul A: Clinical benefits of an immune-enhancing diet for early postinjury enteral feeding. J Trauma 1994,37:607-615.
9. Jones C, Palmer TE, Griffiths RD: Randomized clinical outcome study of critically ill patients given glutamine-supplemented enteral nutrition. Nutrition 1999, 15:108-115.

10. Taylor SJ, Fettes SB, Jewkes C, Nelson RJ: Prospective, randomized controlled trial to determine the effect of early enhanced enteral nutrition on clinical outcome in mechanically ventilated patients suffering head injury. Crit Care Med 1999, 27:2525-2531.
11. Mansell PI, Macdonald IA: Reappraisal of the Weir equation for calculation of metabolic rate. Am J Physiol 1990,258:R1347-R1354.
12. Miles JM: Energy expenditure in hospitalized patients: implications for nutritional support. Mayo Clin Proc 2006, 81:809-816.
13. Baudouin SV, Evans TW: Nutritional support in critical care. Clin Chest Med 2003, 24(4):633-644.
14. Reid C: Frequency of under- and overfeeding in mechanically ventilated ICU patients: causes and possible consequences. J Hum Nutr Diet 2006, 19:13-22.
15. Dickerson RN, Boschert KJ, Kudsk KA, Brown RO: Hypocaloric enteral tube feeding in critically ill obese patients. Nutrition 2002, 18:241-246.
16. Trahan K, Gore DC: Nutritional support. Chest Surg Clin N Am 2002, 12(2):227-249.
17. Moore FA, Moore EE, Kudsk KA, Brown RO, Bower RH, Koruda MJ, Baker CC, Barbul A: Clinical benefits of an immune-enhancing diet for early postinjury enteral feeding. J Trauma 1994,37:607-615.
18. Moore FA, Moore EE: The benefits of enteric feeding. Adv Surg 1996, 30:141-154.
19. Melis M, Fichera A, Ferguson MK: Bowel necrosis associated with early jejunal tube feeding: a complication of postoperative enteral nutrition . Arch Surg 2006, 141:701-704.

TABLES

Table 1- Data recorded in the present study on 5th day of hospital admission.

Mean ± SD	Length of hospital stay in totality	Length of stay in ICU	Post-op infection rate	Serum lactate	Serum bilirubin	Serum triglyceride
Group A	1.098±0.33	1.69±0.91	1.4±0.09	1.765±0.67	1.66±1.01	1.3±1.005
Group B	2.98± 1.95	2.17±1.5	0.56±0.11	0.7±0.03	2.01±1.93	2.98±1.59
P value	0.001	0.06	0.04	0.087	0.19	0.388

P value ≤ 0.05 is significant