



ORIGINAL ARTICLE

Assessment of long chain *n*-3 polyunsaturated fatty acid status and clinical outcome in adults receiving home parenteral nutrition

David A.J. Lloyd ^{a,b,*}, Sarah E. Paynton ^b, Paul Bassett ^a,
Anna Rodriguez Mateos ^c, Julie A. Lovegrove ^c, Simon M. Gabe ^{a,d},
Bruce A. Griffin ^b

^a Lennard-Jones Intestinal Failure Unit, St Mark's Hospital, Harrow, UK

^b School of Biomedical and Molecular Sciences, University of Surrey, Guildford, UK

^c Hugh Sinclair Unit of Human Nutrition, University of Reading, Reading, UK

^d Division of Surgery, Oncology, Reproductive Biology and Anaesthetics, Imperial College, London, UK

Received 23 October 2007; accepted 5 June 2008

KEYWORDS

Parenteral nutrition;
HPN;
Fatty acid;
n-3 PUFA;
Fish oils;
Complications

Summary

Background & aims: Long term parenteral nutrition rarely supplies the long chain *n*-3 polyunsaturated fatty acids (PUFA), eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA) and docosahexaenoic acid (DHA). The aim of this study was to assess long chain *n*-3 PUFA status in patients receiving home parenteral nutrition (HPN).

Methods: Plasma phospholipid fatty acids were measured in 64 adult HPN patients and compared with 54 age, sex and BMI matched controls. Logistic regression analysis was used to identify factors related to plasma fatty acid fractions in the HPN patients, and to identify factors associated with the risk of clinical complications.

Results: Plasma phospholipid fractions of EPA, DPA and DHA were significantly lower in patients receiving HPN. Factors independently associated with low fractions included high parenteral energy provision, low parenteral lipid intake, low BMI and prolonged duration of HPN. Long chain *n*-3 PUFA fractions were not associated with incidence of either central venous catheter associated infection or central venous thrombosis. However, the fraction of EPA were inversely associated with plasma alkaline phosphatase concentrations.

* Corresponding author. Lennard-Jones Intestinal Failure Unit, St Mark's Hospital and Academic Institute, Watford Road, Harrow HA1 3UJ, UK. Tel.: +44 020 8869 5806; fax: +44 020 8235 4001.

E-mail address: dajl@btinternet.com (D.A.J. Lloyd).

Conclusions: This study demonstrates abnormal long chain *n*-3 PUFA profiles in patients receiving HPN. Reduced fatty acid intake may be partly responsible. Fatty acid metabolism may also be altered.

© 2008 Elsevier Ltd and European Society for Clinical Nutrition and Metabolism. All rights reserved.

Introduction

The first patients were discharged home on long term parenteral nutrition in the late 1960s.¹ Since then, home parenteral nutrition (HPN) has become standard treatment for patients with chronic severe intestinal failure. The lipid content of parenteral nutrition admixtures administered to patients receiving HPN is very variable reflecting the energy needs of the individual and the extent to which essential fatty acids (EFA) can be absorbed enterally. Due to the perceived adverse effects of parenteral lipids, many centres that manage significant numbers of patients requiring HPN try to minimise parenteral lipid administration.^{2–4} However, many patients with high parenteral energy requirements will still require intravenous lipid as an energy source due to the considerably higher energy density of lipid emulsions compared to glucose solutions.

Well tolerated intravenous lipid emulsions were developed in the early 1960s.^{5,6} The first generation of lipid emulsions were based on soy and/or safflower oil.^{5,7} Intralipid, based on soy oil, was introduced in 1962⁸ and remains widely used in the parenteral infusions of patients receiving HPN. Soy oil consists almost exclusively of long chain triglycerides (LCT). It is rich in polyunsaturated fatty acids (PUFA) with a very high linoleic acid (LA) and lower α -linolenic acid (ALA) content. There is some evidence that the high *n*-6 PUFA content of the first generation lipid emulsions may have a detrimental effect on leucocytes and may impair immune function.⁹ In addition, soy oil contains relatively little of the antioxidant α -tocopherol and it has been suggested that this, coupled with the high PUFA content, may result in oxidative stress when these lipids are infused.¹⁰

The concerns over the unbalanced fatty acid profiles of the first generation of lipid emulsions led to the development of second generations of lipid emulsions, incorporating medium chain triglycerides (MCT), structured triglycerides (STG) and monounsaturated fatty acids (MUFA), and third generation lipid emulsions, containing fish oils, a rich source of the long chain *n*-3 PUFA, eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA) and docosahexaenoic acid (DHA). Although second generation lipid emulsions have been used in adult HPN patients,¹¹ there are no published reports of third generation lipid emulsions being used for long term parenteral nutrition in adults.

Studies of fatty acid status in plasma and erythrocyte phospholipids of adults receiving HPN have tended to focus on the presence or absence of essential fatty acid deficiency (EFAD) with the aim of estimating parenteral lipid requirements.³ Historically, there has been less interest in the status of longer chain PUFA and no studies have specifically investigated long chain *n*-3 PUFA status in adults receiving HPN. While there has been considerable interest

in the metabolism of *n*-6 PUFA in HPN patients, the effect of HPN on *n*-3 PUFA metabolism is less clearly understood. This is partly due to the discrepancies in *n*-3 PUFA concentrations reported in the various studies of fatty acid status in patients receiving HPN.^{3,12–14} The aims of this study were to investigate the plasma fatty acid status of patients receiving HPN, to determine if long chain *n*-3 PUFA status was normal in these patients, and to explore whether fatty acid status, and particularly long chain *n*-3 PUFA status, was related to clinical outcome and the incidence of parenteral nutrition related complications.

Materials and methods

Clinical data collection

Ethical approval for the study was obtained from the Harrow Local Research Ethics Committee (REC Ref 06/Q0405/46). Patients receiving HPN were identified from a database of intestinal failure patients and were contacted prior to attending routine follow-up appointments at St Mark's Hospital, Harrow. Patients were eligible for inclusion in the study if they had received parenteral nutrition (including fluid and electrolytes only) for ≥ 3 months. Patients were excluded if they required hospital admission due to acute sepsis or other illness, and if they were < 18 years old, pregnant or unable to give written consent.

Clinical data were obtained by direct patient interview and review of case records. Data collected included patient age, gender, underlying diagnosis and duration of HPN. Gastrointestinal tract anatomical characteristics, including small bowel length (assessed either by operative measurement or contrast study) and the presence or absence of colon in continuity with small intestine were recorded. Anthropometric data including height and weight were collected for all patients and used to calculate body mass index (BMI). Estimated energy requirements (EER) were calculated using Schofield energy equations¹⁵ to obtain an estimate of basal metabolic rate (BMR) coupled with a 30% activity factor. Pharmacy records were used to obtain data regarding parenteral nutrition formulations, total parenteral energy intake and parenteral lipid intake.

The incidence of complications over the previous 12 months was recorded for all patients. Catheter related venous thrombosis was defined as thrombosis of a central vein associated with the presence of an intravenous catheter in that vein. Diagnosis of CVC associated sepsis was based on presentation with pyrexia and rigors associated with infusion via the CVC, coupled with positive blood cultures taken via the CVC. Chronic cholestasis was defined as a persistent elevation (> 1.5 times the upper limit of the normal reference range, for > 6 months) of two of the

Download English Version:

<https://daneshyari.com/en/article/2687491>

Download Persian Version:

<https://daneshyari.com/article/2687491>

[Daneshyari.com](https://daneshyari.com)