

Effects of fish oil supplementation on coagulopathy responses and organ injury in septic rats

CHAO, CHE-YI; YEH, SUNG-LING; LIN, MING-TSAN; CHEN, WEI-JAO
Chao Cy; Yeh SL; Lin MT; Chen WJ

Abstract

This study was designed to investigate the effects of preinfusion with total parenteral nutrition (TPN) using fish-oil (FO) versus safflower-oil (SO) emulsion as fat sources on hepatic lipids, plasma amino-acid profiles, and inflammatory-related mediators in septic rats. Normal rats, with internal jugular catheters, were assigned to two different groups and received TPN. TPN provided $300 \text{ kcal} \cdot \text{kg}^{-1} \cdot \text{d}^{-1}$, with 40% of the non-protein energy as fat. All TPN solutions were isonitrogenous and identical in nutrient composition except for the fat emulsion, which was made of SO or FO. After receiving TPN for 6 d, each group of rats was further divided into control and sepsis subgroups. Sepsis was induced by cecal ligation and puncture; control rats received sham operation. All rats were classified into four groups as follows: FO control group (FOC; $n = 7$), FO sepsis group (FOS; $n = 8$), SO control group (SOC; $n = 8$), and SO sepsis group (SOS; $n = 9$). The results of the study demonstrated that plasma concentrations of triacylglycerol and non-esterified fatty acids did not differ between the FO and SO groups, regardless of whether the animals were septic. SOS had significantly higher total lipids and cholesterol content in the liver than did the SOC group. The FOS group, however, showed no difference from the FOC group. Plasma leucine and isoleucine levels were significantly lower in the SOS group than in the SOC group, whereas no difference in these two amino acids was observed between the FOC and FOS groups. Plasma arginine levels were significantly lower in both septic groups than in the groups without sepsis when either FO or SO was infused. Plasma glutamine levels, however, did not differ across groups. No differences in interleukin-1 β , interleukin-6, tumor necrosis factor- α , or leukotriene B4 concentrations in peritoneal lavage fluid were observed between the two septic groups. These results suggest that catabolic reaction in septic rats preinfused with FO is not as obvious as those preinfused with SO. Compared with SO emulsion, TPN with FO emulsion prevents liver fat accumulation associated with sepsis. However, parenterally administered FO had no beneficial effect in lowering cytokines and LTB4 levels in peritoneal lavage fluid in septic rats induced by cecal ligation and puncture.