

FLAXSEED OIL SUPPLEMENTATION INCREASES PLASMA AND TISSUE CONCENTRATIONS OF (ω -3) FATTY ACIDS IN RATS

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α -Linolenic acid (ALA) is a major dietary (ω -3) fatty acid. The essential fatty acids must be absorbed by food intake and play a very important role in the coagulation (inhibition of platelets aggregation) and in the inflammatory reaction (anti-inflammatory effects). In cardiovascular diseases, particularly in coronary diseases, studies demonstrated a decreased mortality in populations who eat an omega-3 rich diet or who take an omega-3 supplement.

We studied the bioavailability of acute supplementation of scalar doses of flaxseed oil (Organic Oils–Perugia) by analysing the level of ALA (ω -3) and Linoleic acid (ω -6) in serum and tissues (adipose, liver and brain) of rats tested at 2-4-8-16 h after the administration. The amount of flaxseed oil administered by oral rate was 1.9, 4.7, 9.5 mL/kg corresponding to 1, 2.5, 5 g ALA/kg. Two techniques of lipid extraction were investigated to achieve maximal free fatty acids recovery in a reasonably short time. The corresponding fatty acid methyl esters obtained with direct methylation with MeOH/HCl, were quantified by gas chromatography/mass spectrometry (GC/MS) technique. GC-MS analyses were performed on a Gas-Chromatograph Varian 3400 on a HP-INNOWAX column (30 m x 0.25 mm; 0.25 μ m film thickness). Mass spectra were acquired on a Finnigan MAT SSQ 710A mass spectrometer in the electron impact (EI) mode with an ionization energy of 70 eV; the ion source temperature was 250°C, the filament current was 200 μ A, the conversion dynode power was – 15.0 kV and electron multiplier voltage was 1500 V.

Serum ALA levels at 1 g/kg after 2h in the flaxseed oil group (n=25) increased by 70% from 0.067 ± 0.007 to 0.096 ± 0.008 mg/mL ($P < 0.001$ Anova) whereas no significant increase occurred in the flaxseed oil group at 2.5 g/kg (0.142 ± 0.009) or at 5 g/kg after 2 h (0.140 ± 0.008) when compared with the value obtained with 1 g/kg. ALA (1g/kg) significantly increased after 4 h in adipose tissue and in liver but also in this case at higher doses (2.5-5 g/kg) the concentration wasn't increased. Concerning linoleic acid (ω -6) no significant increased concentrations were found in serum at the three doses studied confirming that flaxseed oil is a source of ω -3 fatty acids. These data suggested that there is a limiting step in the adsorption of these fatty acids and that there is no advantage to take more than 1 g/kg of ALA supplementation.