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A randomised cross-over trial in healthy adults indicating improved absorption of omega-3 fatty acids by pre-emulsification



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Abstract

Background

The health benefits of increased intakes of omega-3 fatty acids are well established but palatability often presents a problem. The process of emulsification is used in the food industry to provide a wider spectrum of use, often with the result of increased consumption. Moreover, as emulsification is an important step in the digestion and absorption of fats, the pre-emulsification process may enhance digestion and absorption. In this study the levels of plasma fatty acid and triacylglycerol (TAG) following the ingestion of either an oil mixture or an emulsified oil mixture have been compared.

Methods

In this randomised cross-over study, 13 volunteers received the oil mixture and 11 received the oil emulsion as part of an otherwise fat free meal. Blood samples were collected at 0, 1.5, 3, 4.5, 6, 7.5 and 9 hours after ingestion of oil, separated and stored at -20°C. Plasma triacylglycerols were assessed spectrophotometrically and fatty acids were determined by gas chromatography. Following a washout period of twenty days the procedure was repeated with the assignments reversed.

Results

The postprandial plasma TAG and the C18:3 (n-6), C18:3(n-3), C20:5(n-3) and C22:6 (n-3) polyunsaturated fatty acid (PUFA) levels for the emulsified oil group were increased significantly ($P = 0.0182$; $P = 0.0493$; $P = 0.0137$; $P < 0.0001$; $P = 0.0355$ respectively) compared with the non-emulsified oil group. The C16:0 and C18:0 saturated fatty acids, the C18:1 (n-9) monounsaturated fatty acid and the C18:2 PUFA were not significantly different for the oil and emulsified oil groups.

Conclusion

Pre-emulsification of an oil mixture prior to ingestion increases the absorption of longer chain more highly unsaturated fatty acids (especially eicosapentaenoic acid and docosahexaenoic acid) but does not affect absorption of shorter chain less saturated fatty acids, suggesting that pre-emulsification of fish oils may be a useful means of boosting absorption of these beneficial fatty acids.

Trial registration: Current Controlled Trials ISRCTN43202606



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