

Choline-chloride-based eutectic solvent for the efficient production of docosahexaenoyl and eicosapentaenoyl ethanolamides via an enzymatic process

ABSTRACT

Docosahexaenoyl and eicosapentaenoyl ethanolamides (DHEA and EPEA) have physiological functions, including immunomodulation, brain development, and anti-inflammation, but their efficient production is still unresolved. In this study, choline-chloride-based natural deep eutectic solvents are used as media to improve the production of DHEA and EPEA. The water content showed a key effect on the reactant conversion. Adding water to choline chloride–glucose (CG, molar ratio of 5:2) led to a significant increase (13.03% for EPEA and 27.95% for DHEA) in the yields after 1 h. The high yields of EPEA (96.84%) and DHEA (90.06%) were obtained under the optimized conditions [fish oil ethyl esters/ethanolamine molar ratio of 1:2, temperature of 60 °C, 1 h, enzyme loading of 2195 units, and CG containing 8.50% water of 43.30% (w/w, relative to total reactants)]. The products could be easily separated using centrifugation. In summary, the research has the potential to produce fatty acyl ethanolamides.

Keyword: Natural deep eutectic solvents; Docosahexaenoyl ethanolamide; Eicosapentaenoyl ethanolamide; Enzymatic synthesis