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Ethanol modified Supercritical Carbon Dioxide Extraction of α -eleostearic Acid Enriched Oil from Bitter Gourd Seed and Antioxidative Activity

Wang, Ya-Hung¹⁾, Chao, Pei-Ming¹⁾, Chang, Chieh-Ming²⁾, Wu, Jia-Jiuan¹⁾ *

¹⁾ Department of Nutrition, China Medical University, Taichung, Taiwan

²⁾ Department of Chemical Engineering, National Chung Hsing, Taichung, Taiwan,

* Corresponding author, e-mail : jjwu@mail.cmu.edu.tw

Abstract

The α -eleostearic acid (α -ESA) rich in bitter gourd seeds is a kind of conjugated linolenic acid (CLN), which possesses ability of reducing body fat, inhibition of lipid peroxidation, and antioxidative activity. This study investigated total yield, recovery of triglycerides concentration and α -ESA concentration in the extracts and their antioxidative activities. *n*-Hexane Soxhlet extraction at 4, 8, 16 hours and SC-CO₂ extractions at a fixed temperature (40°C) and pressure (350 bar) were subjected to shelled and de-shelled bitter gourd seeds. Response surface methodology with a central composite design was employed in examining effects of co-solvent addition and solvent to solid ratio (SSR) on the total yield (TY), concentration of triglycerides (C_{TG}), recovery of triglycerides (R_{TG}), concentration of α -ESA (C_{ESA}), free radical scavenging (DPPH) and concentration of total phenols (C_{phenol}) in the extracts. SSR ranged from 80 to 100, ethanol additions ranged from 0 to 40 g. The analysis of antioxidative activity was studied by a 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging assay. Experimental results showed that the highest values of TY, C_{TG}, R_{TG}, C_{ESA}, DPPH, C_{phenol} in the 8-hr Soxhlet extract were 57.5%, 888.8 mg/g, 100%, 648.5 mg/g, 46.9%, and 208.3 mg/g, respectively. The ethanol modified SC-CO₂ extractions present the highest DPPH scavenging ability and the highest total phenol content, which is better than that of Soxhlet extractions. This study demonstrated that the SC-CO₂ extraction of α -eleostearic acid from bitter gourd seeds is feasible and sustainable in the development of health food from natural materials.

Keywords Bitter gourd seed oil, α -eleostearic acid, supercritical carbon dioxide extraction, free radical scavenging ability