Assessment of Conventional Solvent Extraction vs. Supercritical Fluid Extraction of Khella (Ammi visnaga L.) Furanochromones and Their Cytotoxicity

Noha Khalil ,Mokhtar Bishr , Mohamed El-Degwy , Mohamed Abdelhady , Mohamed Amin and Osama Salama

Abstract

Background: Khella (Ammi visnaga Lam.) fruits (Apiaceae) are rich in furanochromones, mainly khellin and visnagin, and are thus incorporated in several pharmaceutical products used mainly for treatment of renal stones. Methods: The objective of this study was to compare the yield of khellin and visnagin obtained using different conventional solvents and supercritical fluid extraction (SCFE) with carbon dioxide (containing 5% methanol as co-solvent). Water, acetone and ethanol (30% and 95%) were selected as conventional solvents. Results: Highest extract yield was obtained from 30% ethanol (15.44%), while SCFE gave the lowest yield (4.50%). However, the percentage of furanochromones were highest in SCFE (30.1%), and lowest in boiling water extract (5.95%). HPLC analysis of conventional solvent extracts showed other coumarins that did not appear in supercritical fluid extraction chromatogram due to non-selectivity of solvent extraction. Ammi visnaga extracts as well as standard khellin and visnagin were tested for their cytotoxic activity using sulforhodamine B assay on breast cancer (MCF-7) and hepatocellular carcinoma (Hep G2) cell lines. Results revealed a strong cytotoxic activity (IC50 < 20 Õg/mL) for the SCFE and standard compounds (khellin and visnagin) (IC50 ranging between 12.54 Ñ 0.57 and 17.53 Ñ 1.03 Õg/mL). However, ethanol and acetone extracts had moderate cytotoxic activity (IC50 20ï90 Õg/mL) and aqueous extract had a weak activity (IC50 > 90 Õg/mL). Conclusions: Thus, supercritical fluid extraction is an efficient, relatively safe, and cheap technique that yielded a more selective purified extract with better cytotoxic activity.

Molecules 2021, February