Antioxidant Properties of Essential Oil Extracted from Pinus morrisonicola Hay Needles by Supercritical Fluid and Identification of Possible Active Compounds by GC/MS

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ABSTRACT

Pine (Pinus morrisonicola Hay, PM) needles have been used as folk medicine for their antihypertension and lipid-lowering effects. As supercritical fluid extraction (SFE) is considered an ideal technique for the extraction of essential oil from plant materials, the present work investigated the optimal SFE conditions and the protective effects of different resulting fractions of PM needles on lipid peroxidation and foam cell production in macrophages. Nine PM needle extracts (PME1-9) were obtained in 1–4% yields using different SFE conditions, of which PME1 had the lowest yield (1.1%) and PME3 the highest (3.9%). PME3 exhibited lower cytotoxic effects and stronger inhibition of lipid peroxidation and formation of foam cell in RAW 264.7 macrophages than those of other PME extracts. PME3-1 purified from PME3 by column and thin layer chromatography inhibited LDL oxidation more effectively than did PME3 in a cell-free system oxidized by Cu2+. PME3-1 dose-dependently (25–100 μg/mL) decreased conjugated diene levels and foam cell formation induced by ox-LDL. GC/MS analyses revealed that 1-docosene, neophytadiene, and methyl abietate were increased 5.2-, 1.7- and 4.3-fold in PME3-1 relative to PME3. A new hydrocarbon compound, cedrane-8,13-diol, was identified in PME3-1. Overall, the present study demonstrates the optimal extraction conditions of SFE of PM and identifies the most potent antioxidant fractions and possible active compounds in PM.

Keywords: Pinus morrisonicola Hay; supercritical fluid extract; essential oil; lipid peroxidation; foam c...