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In Vitro Antioxidant, Antiinflammation, and Anticancer Activities and Anthraquinone Content from *Rumex crispus* Root Extract and Fractions

Taekil Eom [1], Ekyune Kim [2], Ju-Sung Kim [1]

Affiliations

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Abstract

Rumex crispus is a perennial plant that grows in humid environments across Korea. Its roots are used in traditional Korean medicine to treat several diseases, including diseases of the spleen and skin and several inflammatory pathologies. In this study, different solvent fractions (*n*-hexane, dichloromethane, ethyl acetate, *n*-butanol, and aqueous fractions) from an ethanol extract of *R. crispus* roots were evaluated for the presence and composition of anthraquinone compounds and antioxidants by checking for such things as free radical scavenging activity, and electron and proton atom donating ability. In addition, anti-inflammatory activity was measured by NO scavenging activity and inflammatory cytokine production; furthermore, anti-cancer activity was measured by apoptosis-inducing ability. Polyphenolic and flavonoid compounds were shown to be abundant in the dichloromethane and ethyl acetate fractions, which also exhibited strong antioxidant activity, including free radical scavenging and positive results in FRAP, TEAC, and ORAC assays. HPLC analysis revealed that the dichloromethane fractions had higher anthraquinone contents than the other fractions; the major anthraquinone compounds included chrysophanol, emodin, and physcione. In addition, results of the anti-inflammatory assays showed that the ethyl acetate fraction showed appreciable reductions in the levels of nitric oxide and inflammatory cytokines (TNF-α, IL-1β, and IL-6) in Raw 264.7 cells. Furthermore, the anthraquinone-rich dichloromethane fraction displayed the highest anticancer activity when evaluated in a human hepatoma cancer cell line (HepG2), in which it induced increased apoptosis mediated by p53 and caspase activation.

Keywords: Rumex crispus; anthraquinone; apoptosis; free radical scavenging; inflammatory cytokines.

Figures

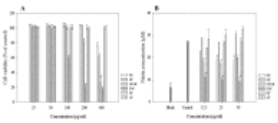

Figure 1 Cell viabilities of *R crispus*...

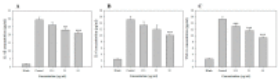

Figure 2 Inhibition of LPS induced IL-1b,...

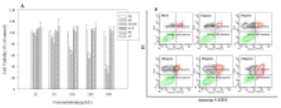

Figure 3 Cell viability of *R crispus*...

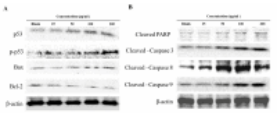

Figure 4 Effects of DCMF on the...

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