



# Anti-inflammatory sesquiterpenes from *Costus speciosus* rhizomes

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## Abstract:

**Ethnopharmacological relevance:** *Costus speciosus* (Koen ex. Retz.) Sm. (crepe ginger, family Costaceae) is an ornamental plant used in traditional medicine for the treatment of inflammation, rheumatism, bronchitis, fever, headache, asthma, flatulence, constipation, helminthiasis, leprosy, skin diseases, hiccough, anemia, as well as burning sensation on urination. **Aim of the study:** The present study is designed to isolate and identify the active compounds from *C. speciosus* rhizomes and measure their anti-inflammatory activities. **Materials and methods:** The n-hexane/CHCl<sub>3</sub> soluble fraction of the MeOH extract of *C. speciosus* rhizomes has been subjected to a repeated column chromatography, including normal silica gel and RP-18 column to give eight compounds. The structures of these compounds were established by UV, IR, 1D (1H and 13C), and 2D (1H-1H COSY, NOESY, HSQC, and HMBC) NMR experiments and HRESIMS data. In addition, the anti-inflammatory activity of compounds 1-8 was evaluated by measuring the levels IL-6, IL-1 $\beta$ , TNF- $\alpha$ , COX-2, lipoxgenase-5, and PGE2 using enzyme-linked immunosorbent assay. **Results:** The n-hexane/CHCl<sub>3</sub> soluble fraction afforded a new eudesmane acid, specioic acid (8), along with seven known compounds, 22,23-dihydrospinaesterone (1), dehydrodihydrocostus lactone (mokko lactone) (2), dehydrocostus lactone (3), stigmasterol (4), arbusculin A (5), santamarine (douglanin) (6), and reynosin (7). Compounds 1, 4, and 5-7 were isolated for the first time *C. speciosus*. Compounds 1-4 displayed potent anti-inflammatory activity, while 7 and 8 showed moderate activity. Compounds 1-8 exhibited a concentration-related decrease in the levels of IL-1 $\beta$ , IL-6, TNF- $\alpha$ , PGE2, lipoxgenase-5, and COX-2. Compounds 5 and 6 did not significantly decrease levels of different cytokines, PGE2, lipoxgenase-5, and COX-2 from PHA treatment at 1 mM. However, all tested compounds significantly decreased cytokines, PGE2, lipoxgenase-5, and COX-2 levels at concentration 100 mM. It is noteworthy that compounds 1-4 had the highest activity, where it lowered levels of cytokines, PGE2, lipoxgenase-5, and COX-2 to the extent that was no statistical difference from the control group. Thus, they decreased proinflammatory cytokines (IL-1 $\beta$ , IL-6, and TNF- $\alpha$ ) with decreased level of the target enzymes (COX-2 and lipoxgenase-5) and subsequent reduction of its inflammatory product (PGE2). **Conclusion:** Good anti-inflammatory activities exhibited of the isolated compounds from *C. speciosus* corroborate the usefulness of this plant in the traditional treatment of inflammation and related symptoms.

## Keywords:

*Costus speciosus* Costaceae Sesquiterpenes Eudesmane acid Anti-inflammatory activity

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