

Chemical composition and cytotoxic properties of *Clinacanthus nutans* root extracts

Abstract

Context: *Clinacanthus nutans* Lindau (Acanthaceae) is a medicinal plant that has been reported to have anti-inflammatory, antiviral, antimicrobial and antivenom activities. In Malaysia, it has been widely claimed to be effective in various cancer treatments but scientific evidence is lacking.

Objective: This study investigates the chemical constituents, anti-proliferative, and apoptotic properties of *C. nutans* root extracts.

Materials and methods: The roots were subjected to solvent extraction using methanol and ethyl acetate. The anti-proliferative effects of root extracts were tested at the concentrations of 10 to 50 µg/mL on MCF-7 and HeLa by using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assay for 72 h. Morphological changes were observed under light microscope. Pro-apoptotic effects of root extracts were examined using flow cytometric analysis and RT-PCR. The chemical compositions of root extracts were detected using GC-MS.

Results: The proliferation of MCF-7 cells was inhibited with the IC₅₀ values of 35 and 30 µg/mL, respectively, for methanol and ethyl acetate root extracts. The average inhibition of HeLa cells was ~25%. Induction of apoptosis in MCF-7 was supported by chromatin condensation, down-regulation of *BCL2* and unaltered expression of *BAX*. However, only ethyl acetate extract caused the loss of mitochondrial membrane potential. GC-MS analysis revealed the roots extracts were rich with terpenoids and phytosterols.

Discussion and conclusions: The results demonstrated that root extracts promote apoptosis by suppressing *BCL2* via mitochondria-dependent or independent manner. The identified compounds might work solely or cooperatively in regulating apoptosis. However, further studies are required to address this.