

Osteoblast and osteoclast modulation by triterpenes and ellagitannins from *Bischofia javanica* leaves

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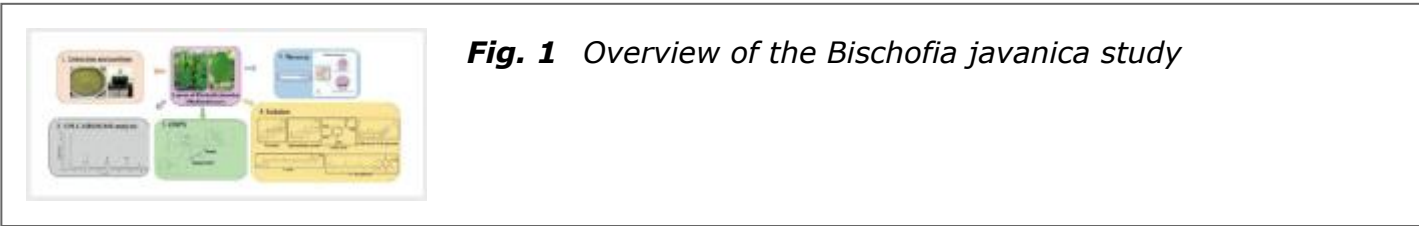
Further Information

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Bischofia javanica (茄冬 Jia Dong', Phyllanthaceae family), is traditionally used in Taiwan to treat joint inflammation, asthma, and infections. It is also consumed as a culinary ingredient to promote musculoskeletal strength, as reflected in folkloric practices by renowned artist Hsu Po-Yih (許伯夷).

Maintaining homeostasis requires balanced nutrition and immune regulation, both essential for muscle, organ, and nerve development, while imbalance contributes to chronic conditions like osteoporosis [1], diabetes, and cancer. Given its long-standing use and safety profile, *B. javanica* is a promising candidate for further biomedical investigation [2].

This study evaluated the effects of *B. javanica* extracts with different polarities on bone cell differentiation. The crude 80% ethanolic (10 µg/mL) and 80% methanolic (80 µg/mL) extracts significantly promoted osteoblast differentiation (induced ALP activity) and inhibited osteoclast formation (reduced TRAP activity). Notably, the hexane fraction (80 µg/mL) suppressed both cell types, indicating dual regulatory activity. Methanolic fraction further inhibited neutrophilic inflammation and SARS-CoV-2 spike/ACE2 pseudovirus activity. UPLC-MS/MS and GNPS molecular networking identified major compounds in the active methanolic fraction, including gallic acid, ellagic acid, geraniin, corilagin, and vitexin. Additional compounds isolated from the *n*-hexane fraction included major gallic acid, vitamin α-tocopherol, carotenoid lutein and triterpenes friedelin and epifriedelanol acetate ([Fig. 1]). Structural characterization was confirmed via 1D/2D NMR and mass spectrometry. Key constituents – gallic acid, geraniin, and friedelin – demonstrated dual action by promoting osteoblast formation and/or inhibiting osteoclastogenesis.



These findings support the potential of *B. javanica* as a therapeutic agent for bone-related disorders, particularly osteoporosis.

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