

Thesis Title Antioxidants and Anti-inflammatory Activities of Chinese Herbs:
Huang Qin, Huang Lian, and Huang Bai

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ABSTRACT

The three Chinese herbs such as *Scutellaria baicalensis* Georgi (Huang Qin), *Coptis chinensis* Franch (Huang Lian), *Phellodendron chinense* Scheid (Huang Bai) and their combination are associated with antioxidant and anti-inflammatory effects based on their contain of flavonoids and alkaloids. The antioxidants, cytotoxicity, anti-inflammatory properties, and synergistic interaction were conducted to investigate the effect of these plant extracts. The antioxidant activities of individual, binary, and triple combinations were determined using 2,2-Diphenyl-1-picrylhydrazyl (DPPH), 2,2-azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS), and Ferric reducing antioxidant power (FRAP) assays. The results indicated that the paired and triple combinations exhibited superior antioxidant activities than individual extracts with the synergistic index (SI) confirmations, which both paired and triple indicated synergistic or strong synergistic interaction, particularly the triple combination, with IC₅₀ values of 168.79 ± 21.31 µg/mL (DPPH) and 210.34 ± 9.14 µg/mL (ABTS) and FRAP value of 307.37 ± 6.07 mg TE/g extract.

The cytotoxicity effect of individual extract was performed using HaCaT, MRC-5, L6, RAW 264.7, and Vero monkey cells. Huang Qin exhibits the highest toxicity compared to Huang Lian and Huang Bai. The cell survival of all extracts showed a dose-dependent relationship across all treatments. Additionally, all the combinations demonstrated stronger toxicity to the cell viability, particularly the L6 and Vero cell lines, than the single extract.

The anti-inflammatory effects of single, paired, and triple combinations of these plants were evaluated by measuring NO production in RAW 264.7 macrophages. The

combination of Huang Qin and Huang Bai has the most potent anti-inflammatory effect, with an IC_{50} of $44.88 \pm 1.34 \mu\text{g/mL}$, which was not significantly different from that of Huang Qin alone with an IC_{50} of $61.48 \pm 9.94 \mu\text{g/mL}$ ($p < 0.05$).

The study's results indicated that the combinations of Huang Qin, Huang Lian, and Huang Bai, particularly the triple combination exhibited heightened antioxidant activities, while the pairing of Huang Qin and Huang Bai showed the most potent anti-inflammatory effects. This data may facilitate the selection of a suitable plant extract for the application. Specifically, it may function as a supporting component in pharmaceutical formulations and active compounds in cosmetics, addressing issues such as oxidative stress, skin inflammation, and aging-related conditions.

Keywords: Huang Qin, Huang Lian, Huang Bai, Antioxidant, Cytotoxicity, Anti-inflammatory, Synergistic Interaction

