

**Chemical compositions, antimicrobial and antiproliferation activities of flowers of
Leucaena leucocephala (Lam.) De Wit. (Fabaceae)**

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Abstract

Background: Pharmacological activities of phytochemicals have a huge impact on the pharmaceutical research and on the process of developing new drugs. Hence, numerous studies have been conducted to investigate the efficacy of plants, their fractions and isolated pure compounds for discovery of new therapeutic agents. Cancer is considered the most clinically challenging situation and a serious public health threat worldwide. Natural products play a crucial role in cancer prevention and therapy. Some medicinal plants are rich in flavonoids, phenolic acids representing an important source of anticancer drugs.

Aim: The aims of the present study were to isolate the major phytochemical constituents of fresh flowers of *L. leucocephala* grown in Jordan and to examine the antiproliferative and antimicrobial activities and cytotoxicity using brine shrimp test for these flowers.

Methods: From the fresh flowers, three different extracts were prepared using solvents of different polarities. Extraction of the major constituents of fresh flowers was done by using column chromatography. Total phenolic and total flavonoid contents of the extracts were determined by using the Folin-Ciocalteu reagent and Aluminum chloride (AlCl₃) colorimetric methods, respectively. The cytotoxicity of flowers extract was evaluated using brain shrimp toxicity test. Antiproliferation activities of flowers were evaluated against HCT-116, Caco-2, A549, MDA-MB-231, T47D, PC-3 and compared to normal cell lines (Fibroblast) and positive control Doxorubicin using the MTT assay method. The half-maximal inhibitory concentration (IC₅₀) for the extracts was determined.

Antimicrobial activities of extracts were evaluated against two-Gram negative *Escherichia coli*, *Pseudomonas aeruginosa*, and two Gram Positive *Staphylococcus aureus*, *Bacillus subtilis*, bacterial species and the yeast *Candida albicans* by using the dilution method of the micro-titer plate. Minimal inhibitory concentrations (MICs) of the extracts were determined.

Results: The phytochemical analysis of fresh flowers revealed the presence of β -sitosterol in addition to ten phenolic compounds. Six of them were isolated for the first time from this plant species, namely rutin, kaempferol, chlorogenic acid, *trans*-cinnamic acid and *m*-OH-cinnamic acid, in addition to quercetin, luteolin, caffeic acid and gallic acid, isolated earlier from different parts of this species. Water, ethanol and *n*-butanol extracts of *L. leucocephala* flowers did not show any toxicity and exerted LC₅₀ more than 10000 μ g/mL. The growth of cancer cell lines was inhibited by *L. leucocephala* in a dose-dependent manner. The *n*-butanol extract was the most potent against nearly all cell lines. Best anticancer activity was observed with *n*-butanol extract of the flowers on T47D cell line with IC₅₀ = 0.094 mg/mL. Also, *n*-butanol extract showed high antimicrobial activity against *E. coli*, *P. aeruginosa*, *S. aureus*, *B. subtilis* and *albicans* with MICs = 0.390 mg/mL, 3.125 mg/mL, 1.6526 mg/mL, 0.390 mg/mL, and 25 mg/mL respectively.

Conclusion: The data obtained in the present study are the first demonstration for the chemical composition of *L. leucocephala* growing in Jordan. The findings of the *in vitro* study with of *L. leucocephala* can be used as a starting point for further research with this widely cultivated and naturalized species in Jordan.