Styrax tonkinensis Essential Oil Tested against Different Microorganisms *In Vitro*

Natália Čmiková[1]*, Lucia Galovičová[1], Marianna Schwartzová[1], Simona Kunová[2], Milena Vukic[1,3], Miroslava Kačániová[1]

[1]Institute of Horticulture, Faculty of Horticulture and Landscape Engineering, Slovak University of Agriculture in Nitra, Nitra, Slovakia
[2]Institute of Food Science, Faculty of Biotechnology and Food Sciences, Slovak University of Agriculture in Nitra, Nitra, Slovakia
[3]Department of Chemistry, Faculty of Science, University of Kragujevac, Kragujevac, Serbia

Abstract:

Fast-growing, oil-producing woody shrub Styrax tonkinensis is also used for medicine and as a source of wood. Particularly in the last 20 years, natural products and their semi-synthetic analogs have played a significant role in the formulation and development of antimicrobial drugs. This research concerned the antimicrobial and antifungal properties of Styrax tonkinensis essential oil. Using inhibition zones in agar media and minimum inhibitory concentration (MIC) bioassays, the antimicrobial activity was examined in comparison to bacteria, including both Gram-positive and Gram-negative bacteria. Using a solid medium assay, the antifungal action was tested on Aspergillus flavus, Botrytis cinerea, and Candida albicans. According to the results, Styrax tonkinensis essential oil was highly effective at inhibiting both Gram-positive (Listeria monocytogenes, Micrococcus luteus, and Staphylococcus aures) and Gram-negative (Escherichia coli, Klebsiella pneumonia, and Pseudomonas aeruginosa) bacteria. The maximum inhibition zones and MIC values were found to range from 12.67 to 19.33 mm and 3.9 and 62.5 µL/mL. In addition, the Styrax tonkinensis essential oil exhibited antifungal action against A. flavus, B. cinerea, and C. albicans. Research results have shown that Styrax tonkinensis essential oil can be a useful source of natural compounds that can be used as novel antimicrobial agents against microorganisms.

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Flavonoid Derivative FMC, as a Potent Cytotoxic and Apoptosis Inducer in Several Human Cancer Cell Lines

Henoc del Rosario1*, Ester Saavedra1,2, Ignacio Brouard3, Daniel González-Santana3,4, Celina García5, Elena Spínola-Lasso1, Carlos Tabraue6, José Quintana1, Francisco Estévez1.

1Departamento de Bioquímica y Biología Molecular, Instituto Universitario de Investigaciones Biomédicas y Sanitarias (IUIBS), Universidad de Las Palmas de Gran Canaria, Spain;

2 Instituto Canario de Investigación del Cáncer, Spain;

3Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), Spain;

4Facultad de Farmacia, Universidad de La Laguna, Spain;

5 Instituto Universitario de Bio-orgánica AG, Universidad de La Laguna, Spain;

6Departamento de Morfología, Instituto Universitario de Investigaciones Biomédicas y Sanitarias (IUIBS), Universidad de Las Palmas de Gran Canaria, Spain.

Abstract:

Synthetic flavonoids with new substitution patterns have attracted attention as potential anticancer drugs. Here, fourteen flavonoids were synthesized and their antiproliferative activities against five human tumour cells were evaluated. These flavonoids derivatives include two cyclic compounds either with or without a furoyl radical. The structure-activity relationship (SAR) revealed that (i) the presence of a 2′ amino group in 4-methoxychalcone generated a more cytotoxic compound than the corresponding 2′-hydroxy against leukemic cells, and (ii) the introduction of a furoyl radical in position 2′ as an ester or an amide group enhanced the cytotoxicity against leukaemia and melanoma cells; and (iii) the substitution of 2′-hydroxy for a 2′-amino group in 3,4,5-trimethoxychalcones enhanced the cytotoxicity but the corresponding furoyl derivatives did not enhance it as in the case of 4-methoxychalcones. The 4-methoxychalcone containing a furoyloxy radical at 2′ on the A ring (FMC) displayed less cytotoxicity against human peripheral blood mononuclear cells and fibroblast-like Vero cells. Treatment of U-937 and HL-60 cells with FMC inhibited colony formation, induced cell cycle arrest at the G2-M phase, an increase in the percentage of sub-G1 and annexin-V positive cells, the release of mitochondrial cytochrome *c*, activation of caspase and poly (ADP-ribose) polymerase cleavage. In addition, it inhibited tubulin polymerization *in vitro* in a concentration dependent manner and induced changes in BCL-2 family proteins expression and MAPK activation. Cell death triggered by this chalcone was decreased by a pan-caspase inhibitor and was dependent of the generation of reactive oxygen species.

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Lignan Profiling and Antioxidant, Anti-inflammatory and Anticancer Activities of Extracts from *Schisandra henryi* Leaves and Microshoot Cultures Maintained in Plant-Form Bioreactors

Karolina Jafernik[1]*, Michał Dziurka[2], Halina Ekiert[1], Hosam O. Elansary[3], Agnieszka Szopa[1]

[1]Chair and Department of Pharmaceutical Botany, Jagiellonian University, Collegium Medicum, Medyczna Str. 9, 30-688 Cracow, Poland

[2] Polish Academy of Sciences, The Franciszek Górski Institute of Plant Physiology, Niezapominajek Str. 21, 30-239 Cracow, Poland

[3] Department of Plant Production, College of Food & Agriculture Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia

Abstract:

Schisandra henryi is a rare vine-plant species, known in traditional Chinese medicine, but of scientifically unproven biological activities. The aim of our studies was estimation of phytochemical profile and biological activities of leaves as well as established for the first time in vitro cultures of this species. The microshoot cultures were cultivated in PlantForm bioreactors on Murashige-Skoog medium with 2 mg/l indolyl-3-butyric acid and 0.5 mg/l 6-benzyladenine over 30-days (3 series). The antioxidant potential was assessed using: CUPRAC, FRAP, DPPH tests and the total content of polyphenols was assessed with Folin-Ciocalteu assay. The anti-inflammatory activity was measured with *in vitro* inhibition tests of $sPLA_2$, 15-LOX, COX-1 and COX-2. The antitumor activities (antiproliferative and cytotoxic) were estimated against Jurkat, MCF-7, HT-29 and HEK-293 HeLa lines. The lignan profiles of leaf and microshoot extracts were done with UHPLC-MS/MS method. The antioxidant activity of the microshoot cultures assessed by CUPRAC, FRAP and DPPH tests was 3.8-, 5.6- and 3.3-times