

Determination of Essential Oil Composition and Anti-Cancer Activity of *Platycladus orientalis* Grown in Jordan

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Abstract

Background: Cancer is a life-threatening disease and considered as one of the main causes of death globally. Some medicinal plants are rich in volatile oils and flavonoids, representing an important source of anticancer drugs. This study analysis the qualitative and quantitative composition of the essential oils of the fresh leaves parts of *Platycladus orientalis* L. (Franco) (Cupressaceae) collected from four different regions (Amman, Madaba, Sahab and Dead Sea region) in Jordan and evaluates the cytotoxic activity against different tumors cell lines.

Aim: The aim of the present study was to determine the volatile oil compositions of the fresh leaves as well as to evaluate the anti-proliferative activities of the volatile oil and the water and ethanol extracts of *P. orientalis* grown in Jordan.

Methods: The essential oil of the fresh leaves, obtained by hydro-distillation (HD) and the spontaneous emitted organic volatile compounds (VOCs) obtained by solid phase micro extraction method (SPME) were analyzed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) for their qualitative and quantitative comparison. Classes of different secondary metabolites were determined by thin layer chromatography (TLC). *In-vitro* cytotoxic activities of the essential oil and of the two extracts were evaluated against human epithelial breast cancer cell line (MCF-7)- and human colorectal carcinoma (HCT-116) cell lines and compared to Norma cell line (Vero) and Doxorubicin by the MTT method.

Results: The results obtained for the volatile oil composition and for the aroma, profile of *P.orientalis* demonstrated the influence of the environmental factors on the qualitative and quantitative compositions. Hence, as a result of this environmental variation, a difference in the qualitative and quantitative composition of the oils and in the emitted aroma volatiles was noted. The most suitable condition to obtain the highest quantity of the essential oil is the Irano-Turanian climatic conditions. Monoterpene hydrocarbons accounted for compounds with the highest percentage in all samples but in variable quantities. The four major monoterpene hydrocarbons were α -pinene, α -terpinene and the double bond isomers α -thujene and sabinene in the hydro-distilled oils and in the aroma profile. Upon investigation the anti-proliferative activity of *P. orientalis* water and ethanol extracts and essential oil against MCF-7 and HCT-116 cell lines and their cytotoxicity against Vero cell line, better results were observed with the ethanol extract against both tested cell lines.

Conclusion: The data obtained from this study is the first demonstration of the volatile oil composition and aroma profile of the *P. orientalis*, grown in Jordan. The findings of the *in vitro* study with *P. orientalis* can be used as a starting point for further research with this widely cultivated and naturalized species in Jordan.