Phytochemical analysis and biological activity of methanol extract of the lichen *Pleurosticta acetabulum*

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Introduction

Lichens have a very important role in both human and animal nutrition, as well as in the pharmaceutical industry and traditional medicine (1). Lichens synthesize a large number of secondary metabolites and most of these metabolites are unique to the lichen. The extracts of the lichens and their secondary metabolites exhibit a broad spectrum of biological activity (2).

Material and methods

Lichens were collected at the site of the eastern slope of the mountain Kopaonik on the territory of the Republic of Serbia. Extraction was performed with methanol using the Soxhlet apparatus. The phytochemical analysis was carried out by high-performance liquid chromatography (HPLC). The antioxidant activity of the lichen extract was evaluated by measuring the total anti-oxidative capacity, reducing capacity, inhibition lipid peroxidation and scavenging capacity on 2,2-diphenyl-1-picrylhydrazyl (DPPH) and hydroxyl (OH) radicals. To determine total phenols and flavonoids, we used spectrophotometric methods (3). *In vitro* anticancer activity on HeLa S3 adenocarcinoma cervix and LS174 human colon adenocarcinoma cells line was evaluated by MTT assay (4).

Results

Table 1. Total antioxidant capacity , phenolic and flavonoid content

Lichen extract	Total antioxidant capacity (mg AA/g)	Phenolic content (µg GA/mg of extract)	Flavonoid content (µg RU/mg of extract)
Pleurosticta acetabulum	74.29±1.36	73.45±0.82	15.42±0.55

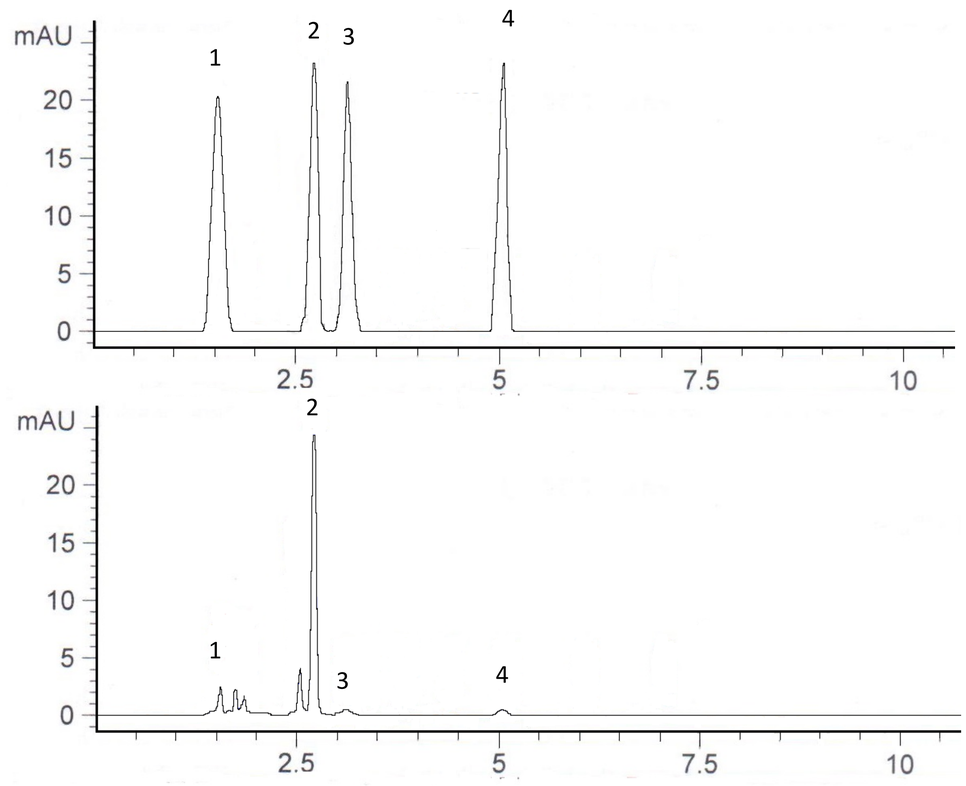

Figure 1. HPLC chromatograms of standards and methanol extract of lichen Pleurosticta acetabulum (254 nm) 1: salazinic acid; 2: norstictic acid; 3:protocetraric acid; 4:evernic acid

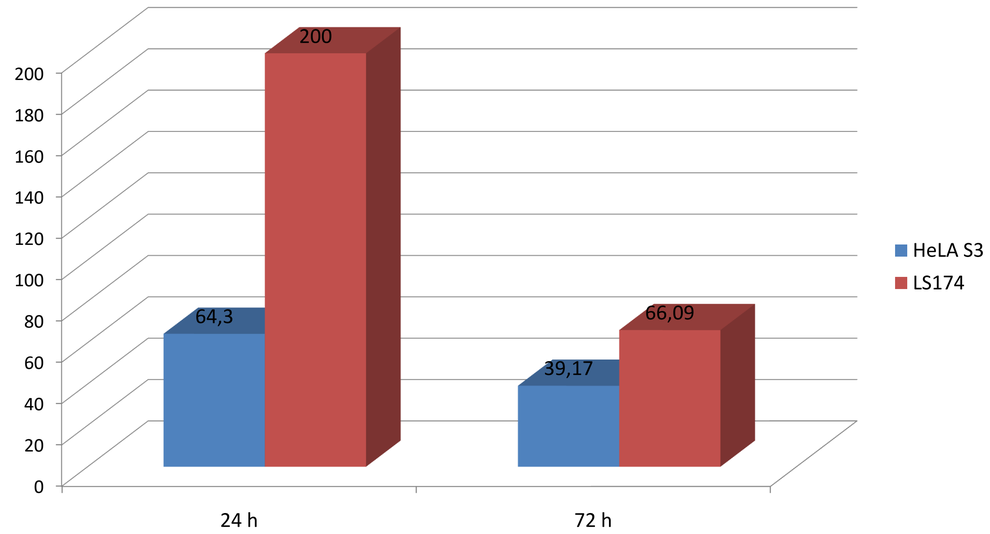

Figure 2. Cytotoxic activity (IC_{50}) of the extract on the HeLa S3 and LS174 cells line after 24 h and 72 h incubation

Table 2. Antioxidant activity: Inhibition lipid peroxidation, DPPH and OH scavenging activity (IC_{50}) and reducing power (absorbance)

Lichen extract	Inhibition lipid peroxidation IC_{50} (µg/ml)	·DPPH scavenging activity IC_{50} (µg/ml)	·OH scavenging activity IC_{50} (µg/ml)	Reducing power-Absorbance (700 nm)				
				1000 µg/ml	500 µg/ml	250 µg/ml	125 µg/ml	62.5 µg/ml
P. acetabulum	74.30±1.48	48.52± 0.77	163.83± 0.95	0.25	0.123	0.063	0.035	0.018
Ascorbic acid	>1000	6.05±0.34	150.55±2.31	2.113	1.654	0.0957	0.0478	0.0247

Conclusion

The present study provides data for supporting the use of *P. acetabulum* extract as natural antioxidant agents and confirms that this extract represents a significant source of phenolic compounds.

References

1. Romagni JG., Dayan F. (2002). Structural diversity of lichen metabolites and their potential use. *Advances in Microbial Toxin Research and Its Biotechnological Exploitation,* 12:151-169.
2. Müller K. (2001). Pharmaceutically relevant metabolites from lichens. *Applied Microbiology and Biotechnology*, 56(1-2):9-16.
3. Manojlovic N. T., Vasiljevic PJ., Maskovic PZ., Juskovic M., & Bogdanovic-Dusanovic, G. (2012). Chemical composition, antioxidant, and antimicrobial activities of lichen Umbilicaria cylindrica (L.) Delise (Umbilicariaceae). *Evidence-based Complementary and Alternative Medicine*, Article ID 452431.
4. Mosmann, T. (1983). Rapid colorimetric assay for cellular growth and survival: application to proliferation and cytotoxicity assays. *Journal of Immunological Methods*, 65(1-2), 55-63.

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