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Biocompounds from mushroom aqueous and polysaccharide extracts

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1 INTRODUCTION

The application of mushrooms for medicinal purposes has a long history, primarily due to its therapeutic properties. Today, mushrooms are often used as functional food or natural sources in the development of various nutraceuticals. Using advanced instrumental techniques, it was shown that mushrooms are a good source of highly valuable polysaccharides (i.e., glucans), sterols (i.e., ergosterol), different antioxidants, proteins and peptides. However, due to the great diversity of fungi, additional research in this area should be performed.

2 AIM

The aim of this study is to analyze biocompounds from polysaccharides and aqueous extracts of two different mushrooms (*A. bisporus* and *A. aegerita*).

Agaricus bisporus

Agrocybe aegerita (Jablanovača)

3 MATERIAL AND METHODS

Mushroom extracts were prepared according to procedure previously desribed by Popović Minić (2023)[1]. Lyophilised mushroom powder was extracted with 80% methanol containing 0.1% HCl, after which the suspension was filtered through 0.45µm filters and used for further chromatographic analysis by UHPLC-QToF-MS. Chemical characterization of mushroom biomolecules was performed using exact mass (m/z) and MS2 fragment ions of each detected compound and their retention times.

Compounds name	ABP	ABW	AAP	AAW
Organic acids and their derivatives				
Fumaric acid	+	+	+	+
Malic acid	+	+	+	+
Citric acid	+	+	+	+
Succinic acid	+	+		+
2-[4-(2-Acetyl-6-acetyloxyundecyl)phenoxy]acetate				+
Pimelic acid (6-Carboxyhexanoate)		+		+
Mono(2-ethylhexyl)maleate				+
Phenolic acids and derivatives				
3,4-Dihydroxybenzoic acid		+		
p-Hydroxybenzoic acid		+		+
4-Methoxybenzoic acid				+
3,4-Dimethoxybenzoate				+
Coumaric acid isomer I				+
m-Hydroxy-hydrocinnamic acid		+		+
Sinapic acid		+		+
Coumaric acid isomer II				+
2-(Pentanoyloxy)benzoate		+		+
4-[3-(2-Methylprop-2-enoyloxy)propyl]benzoate				+
3-(11-Hydroxyundecoxy)benzoate		+		+
Esters				
2,6-dioxo-6-phenylhexa-3-enoate	+	+	+	
Methylmalonic acid monoethyl ester		+		+
3-Hydroxy-5-methoxy-3-methyl-5-oxopentanoate		+		+
4,6-Dioxoheptanoate		+		+
D-Xylobionate		+		
4,7-Dioxo-7-propoxyheptanoate				+
9-Carboxy-6-hydroxynonanoate		+		
1,2-Benzenedicarboxylicacid, 1-(5-carboxy-2-ethylpentyl)ester				+
8-Carboxyoctanoate	+	+	+	+
4-(Acetyloxymethyl)-6-hydroxyhexanoate				+
Mono(2-hydroxyethyl)sebacate	+			
6-(Hexyloxy)-6-oxohexanoate				+
9-(3-Hydroxy-2,2-dimethylpropoxy)-9-oxononanoate				+
Cyclohexanepropanoate		+		+
3-Isopropenyl-6-oxoheptanoate				
9-Methoxy-9-oxononanoate		+	+	+
2-Cyclohexyl-3-ethoxy-3-oxopropanoate		+		+
7-Oxononanoate	+			+
6-Hydroxy-3-isopropenylheptanoate				+
3-(Octyloxy)-3-oxopropanoate	+	+	+	+
9,12,13-Trihydroxyoctadecenoate	+	+	+	+
7,8,17-Trihydroxy-4,9,11,13,15,19-docosahexaenoate				+
(9S,10E,12Z,15Z)-9-Hydroperoxy-10,12,15-octadecatrienoate		+		+
9,10-Dihydroxy-12-octadecenoate				+
(9Z,11E,13S)-13-Hydroperoxy-9,11-octadecadienoate		+		+
(9E)-18-Hydroxy-9-octadecenoate		+		+
(10E,12Z)-9-Oxo-10,12-octadecadienoate		+		+
13-Hydroxy-9,11-octadecadienoate	+	+	+	+
Other organic compounds				
Gibberellin A1				+

Abbreviations: **ABW**-*A.bisporus* water extract; **ABP**-*A.bisporus* polysaccharide extract; **AAW** – *A. aergerita* water extract; **AAP**-*A. aergerita* polysaccharide extract; „+"-detected compounds.

4 RESULTS AND DISCUSSION

The identified compounds represented four structurally distinct groups: 1) organic acids and their derivatives (7 compounds); 2) phenolic acids and their derivatives (11 compounds); 3) esters (28 compounds); and 4) other organic compounds (Gibberellin A1). Based on the obtained results, the differences between the tested samples can be clearly observed. In *A.bisposrus* and *A.aegerita* polysaccharide extracts only few organic acids and esters were detected, while phenolics and majority of esters were not recorded. On the other hand, the presence of organic acids, phenolic acids, esters and their derivatives was confirmed in both aqueous extracts. The highest number of detected compounds (as many as 41 compounds) was detected in the aqueous extract of *A. aegerita*. Among organic acids, fumaric, malic and citric acids were detected in all the mushroom extracts, whereas *p*-hydroxybenzoic acid, *m*-hydroxy-hydrocinnamic acid, sinapic acid, 2-(pentanoyloxy)benzoate, and 3-(11-hydroxyundecoxy) benzoate were detected among phenolic acids and their derivatives in aqueous extracts of both mushrooms. Regarding detected esters, following compounds were identified in the tested samples: 8-carboxyoctanoate, 3-(octyloxy)-3-oxopropanoate, 9,12,13-trihydroxyoctadecenoate, 13-hydroxy-9,11-octadecadienoate.

5 CONCLUSION

The estimated profiles of biocompounds present in mushroom extracts can contribute to the further understanding of their antioxidant and biological properties.

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