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Antioxidant potantials of *Helvella leucomelaena* and *Sarcosphaera coronaria*

Abstract

The present study aimed to determine the total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) of ethanol extracts of *Helvella Leucomelaena* (Pers.) Nannf and *Sarcosphaera coronaria* (Jacq.) J. Schröt. Mushrooms collected from Gaziantep province. TAS, TOS and OSI values were determined with Rel Assay Diagnostics kits. It was determined that the TAS values of *H. leucomelaena* and *S. coronaria* mushrooms were 2.367 and 1.066, respectively, and the TOS values were 55.346 and 41.662, respectively. OSI values were calculated as 2.338 and 3.909 for *H. leucomelaena* and *S. coronaria* mushrooms, respectively. As a result, it has been determined that fungi have high oxidant levels despite antioxidant potential.

Keywords: *helvella leucomelaena*, *sarcosphaera coronaria*, antioxidant, oxidant, oxidative stress.

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Introduction

Mushrooms have long been used for nutritional and medical purposes.[1] They are rich in protein and amino acids, as well as their texture and flavour, low in calories and are considered a nutritious food.[2] In addition to their nutritive properties, they are considered as a significant source of medicinal substances due to their important biologically active compound content.[3,4] Because of the bioactive compounds they include, they play an important role in the prevention of diseases such as hypertension, hypercholesterolemia and cancer.[5] Mushrooms were reported as therapeutic agents beneficial for the prevention or alleviation of bacterial, viral, fungal and parasitic infections.[6,7]

Uncontrolled production of free radicals in metabolism causes the onset of diseases such as cancer, rheumatoid arthritis, cirrhosis, atherosclerosis, cardiovascular diseases, neurological diseases, as well as processes such as aging.[8–10] However, antioxidant supplements or foods that contain antioxidants could be used to reduce the oxidative damage in the human body.[10] Mushrooms could also help reduce the negative effects of oxidative damage due to their antioxidant properties.

The present study aimed to determine the total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) of ethanol extracts of *Helvella Leucomelaena* (Pers.) Nannf. (Figure 1) and *Sarcosphaera coronaria* (Jacq.) J. Schröt. (Figure 2) mushrooms collected from Gaziantep province. These species are cup shaped and grows similar habitats. Although, *H. leucomelaena* is edible species, *S. coronaria* is poisonous species. Especially, *S. coronaria* is a fatal species when consumed raw. So, we try to compare TAS, TOS and OSI level of these edible and poisonous species in the present study.

Materials and methods

Macrofungi specimens were collected from Dülükbaba Picnic Area-Pine Forest in Gaziantep province at 2016. In the field studies, morphological and ecological characters of the specimens were recorded and they photographed in the daylight conditions. After the field studies, the specimens were brought to laboratory with suitable conditions. The microscopic characters of the specimens such as spores shapes and sizes, ascus structures etc. were determined by mounting 3% KOH by using light microscope. The specimens were identified morphologically by references of Dissing,[11] Hansen and Knudsen[12] and Breintenbach & Kränzlin.[13] The indentified specimens were deposited at the laboratory of Gaziantep University.

Figure 1 *Helvella Leucomelaena.*

Figure 2 *Sarcosphaera coronaria.*

Table 1 TAS, TOS and OSI values of fungal samples

Samples	TAS (mmol/L)	TOS (µmol/L)	OSİ (TOS/(TASx10))
H. leucomelaena	2.367	55.346	2.338
S. coronaria	1.066	41.672	3.909

Specimens collected from the field were dried in an incubator at 40°C. After drying, a 30gr sample was weighed and pulverized with a mechanical grinder. It was then extracted with ethanol on a soxhlet apparatus at 50°C (BUCHI Extraction System Model B-811). Extracts that were concentrated under pressure with a rotary evaporator (BUCHI Rotavapor Model R-144) were stored at +4°C until tested.

Determination of the TAS, TOS and OSI values

Rel Assay brand commercial kits (Rel Assay Kit Diagnostics, Turkey) were used to determine of mushroom ethanol extract TAS and TOS values. For the TAS value determination, Trolox was used as a calibrator and the values obtained were expressed asmmol Trolox equiv. /L. Hydrogen peroxide was used as the TOS calibrator and the values obtained were reported as µmol H_2O_2 equiv/L.[14,15] For the determination of OSI values, the units of TAS and TOS units were equalized and the proportion between the TOS and TAS values were calculated. Thus, mushroom oxidative stress indices were determined as percentages.[15]

Result and discussion

TAS, TOS and OSI values

Mushroom ethanol extract TAS (mmol / L), TOS (µmol / L) and OSI values were determined in the study and the results are presented in Table 1.

Mushrooms contain several bioactive compounds. Due to the effects of these bioactive compounds, mushrooms are considered to be a good source of natural antioxidants.[16] In the present study, antioxidant potential of both mushroom species were determined. Thus, both TAS and TOS values of *H. leucomelaena* were found to be higher than that of *S. coronaria*. The OSI values that demonstrate the rate at which the antioxidant compounds in the mushroom tolerate the oxidant compounds were 2.338 for *H. leucomelaena* and 3.909 for *S. coronaria*. TAS values were determined for various mushrooms as follows: *Tricholoma terreum* (Schaeff.) P. Kumm: 0.38, *Coprinus micaceus* (Bull.) Fr.: 0.46, *Omphalotus olearius* (DC.) Singer: 2.83, *Pleurotus eryngii* (DC.) Quél.: 1.93, *Auricularia polytricha* (Mont.) Sacc.: 0.93, *Fomitopsis pinicola* (Sw.) P. Karst: 1.57 and *Geastrum pectinatum* Pers.: 1.28mmol/L.[17–22] TOS values were determined as 16.76 for *T. terreum*, 16.87 for *C. micaceus,* 2.03 for *F. pinicola,* 13.86 for *G. pectinatum,* and 8.26 for *O. olearius*.[17–20] Compared to these studies, the TAS values of *H. leucomelaena* were higher than those of all the above mentioned mushrooms except *O. olearius* and the TAS value of *S. coronaria* was lower when compared to *F. pinicola*, *G. pectinatum*, *P. eryngii* and *O. olearius*. Also, It has been determined that the TOS values of the *H. leucomelaena* and *S. coronaria* mushroom are higher than the TOS values of the fungi in the literature. The high *H. leucomelaena* TAS value indicated that it had more antioxidant potential than the others. However, the high TOS value indicated that higher amounts of oxidative compounds were formed by environmental and metabolic factors in the mushroom. The oxidative stress index, which indicates the extent to which the oxidative factors associated with environmental and internal factors affect the antioxidant system, was found to be lower than the OSI value of *T. terreum*. The high *H. leucomelaena* TAS value indicated that this mushroom can be consumed as a good natural antioxidant source. However, considering the TOS and OSI values of this mushroom, it was suggested to consume the mushrooms collected from more suitable regions based on oxidative stress potential.

Conclusion

Analysis results demonstrated that both *H. leucomelaena* and *S. coronaria* mushrooms had antioxidant potential. However, the presence of high oxidant levels demonstrated the oxidative stress potential of the mushrooms. It was recommended to be careful in consumption of mushrooms collected from these regions in particular. TAS and TOS levels of edible species, *H. leucomelaena* is higher than the poisonous species. So, it can be said that this species can be consumed as natural antioxidant sources under the controlled conditions. But, this species is not preferred by local people of Turkey. Also, *S. coronaria* is known by local people and it consumed some villages of Turkey by cooking, although it is a poisonous species. In the further studies, the antioxidant levels of other species might be determined for using as natural antioxidant sources, and it needs to determined safely usage methods of poisonous species such *S. coronaria*, which has high antioxidant status.

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Conflict of interest

The author declares no conflict of interest.

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