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A Study on antioxidant properties of *Gyrodon lividus*

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Abstract

It is possible to classify mushrooms as edible, inedible and poisonous. The present study aimed to determine the antioxidant potential of *Gyrodon lividus* an edible mushroom species. Thus, total antioxidant status (TAS) and total oxidant status (TOS) of mushroom ethanol extracts were determined and oxidative stress index (OSI) was calculated based on TAS and TOS findings. Based on the study findings, the TAS value was 2.077±0.087, TOS value was 13.465±0.213 and OSI level was 0.651±0.037. Thus, it was suggested that the mushroom had antioxidant potential, however *G. lividus* collected in Burdur province should be consumed with care due to the high oxidative stress levels.

Keywords: *Gyrodon lividus*, edible mushrooms, antioxidant, oxidant, oxidative stress.

Özet

Mantarları yenilebilir, yenmez ve zehirli olarak sınıflandırmak mümkündür. Bu çalışma, yenilebilir mantar türlerinden *Gyrodon lividus*'un antioksidan potansiyelini belirlemeyi amaçlamıştır. Bu nedenle, mantarın etanol ekstrelerinin toplam antioksidan durumu (TAS) ve toplam oksidan durumu (TOS) belirlenerek, TAS ve TOS bulgularına göre oksidatif stres indeksi (OSI) hesaplanmıştır. Araştırma bulgularına göre TAS değeri 2.077±0.087, TOS değeri 13.465±0.213 ve OSI değeri 0.651±0.037 olarak belirlenmiştir. Bu yüzden mantarın antioksidan potansiyele sahip olduğu tespit edilmiştir, fakat Burdur ilinden toplanan *G. lividus'*un yüksek oksidatif stres düzeyleri nedeniyle dikkatli tüketilmesi önerilmektedir.

Anahtar Kelimeler: *Gyrodon lividus*, yenilebilir mantarlar, antioksidan, oksidan, oksidatif stres.

Introduction

Mushrooms are among the natural nutrient resources for humankind. The increase in mushroom consumption was associated with their vitamins and protein content, as well as the pleasant taste and aroma of the edible mushrooms. They are also significant among natural products due to their strong antioxidant properties and the fact that they are natural products, which do not contain any pesticides (Gürgen et al. 2018, Sevindik et al. 2018a).

It is also known that mushrooms have strong antioxidant capacity in addition to their nutritional properties. Furthermore, mushrooms were reported to possess anticarcinogen, antimicrobial, DNA protective, anti-inflammatory and antiallergic effects in addition to their antioxidant properties (Park et al. 2014, Akgül et al., 2016; Lima et al. 2016, Taofiq et al. 2016, Yılmaz et al. 2016, Sevindik et al. 2017).

The present study aimed to determine total antioxidant capacity, total oxidant capacity and oxidative stress index of *Gyrodon lividus* (Bull.) Sacc. mushroom ethanol extract. Thus, antioxidant potential of the mushroom was determined and its consumption as a natural antioxidant source was assessed.

Material and Method

In the autumn of 2017, *G. lividus* samples were collected from sweetgum forest protected area in Burdur Province. The morphological and ecological characteristics of the samples were noted and basidiomata photographed in natural habitats. After field studies, the specimens were taken to the laboratory. Microcharacters were observed with a light microscope. For microscopic analyses, dried material was rehydrated in distilled water and 5% KOH, and subsequently stained in Congo Red. Identification of the specimens was based on Hayward and Thiers (1984), Kibby (2012) and Sesli et al. (2015) (Figure 1). Mushroom specimens were dried in the laboratory under suitable conditions. Dried mushroom samples were extracted with ethanol (EtOH) in a Soxhlet extractor (Gerhardt EV 14). The obtained extracts were concentrated using a rotary evaporator (Heidolph Laborator 4000 Rotary Evaporator).

Figure 1. *Gyrodon lividus* (Bull.) Sacc.

Following the extraction, Rel Assay brand TAS kits were used to determine the total antioxidant status of mushroom extracts and the findings were calculated as mmol/L. Rel Assay brand TOS kits were used to determine the total oxidant status and the findings were calculated as μmol/L. Trolox was used for TAS calibrator and hydrogen peroxide was used as TOS calibrator (Erel 2004, Erel 2005). To determine the OSI value, the TOS and TAS units were equalized and OSI was calculated with the following formula.

$$OSI \frac{TOS, \mu\text{mol } H_2O_2 \text{ equiv./L}}{TAS, mmol\ Trolox\ equiv./L \times 10}$$

Results and Discussion

In recent years, edible mushrooms are at the center of attention as commercial antioxidant resources. They can be used directly in improvement of antioxidant defenses via nutritional supplements to reduce oxidative stress levels (Kozarski et al. 2015). In the present study, TAS, TOS and OSI of *G. lividus* mushroom ethanol extracts were determined and the findings are presented in Table 1.

Table 1. TAS, TOS and OSI values of *Gyrodon lividus*

	TAS	TOS	OSI
G. lividus	2.077±0.087	13.465±0.213	0.651±0.037

Literature review revealed that no previous studies were conducted to determine the total antioxidant status, total oxidant status and oxidative stress index of *G. lividus* mushroom. In previous studies, it was determined that the TAS values of *Auricularia auricula* and *Trametes versicolor* mushrooms were 1.010 and 0.820, respectively and the TOS values for the same mushrooms were 23.910 and 17.760, respectively, and OSI were 2.367 and 2.166, respectively (Akgül et al. 2017). In the present study, it was determined that *G. lividus* mushroom had a higher TAS value when compared to that of the *A. auricula* and *T. versicolor* mushrooms. It was also found that the TOS and OSI values were also lower than those of *A. auricula* and *T. versicolor* fungi. In previous studies, it was also determined that the TAS value of *Pholiota limonella* was 2.378, the TOS value of the same mushroom was 4.742 and the OSI value was 0.199. The TAS value of *Cyclocybe cylindracea* was 4.325, the TOS value of the same mushroom was 21.109 and the OSI value was 0.488 (Sevindik et al. 2018b, Sevindik et al. 2018c). When compared to the results of the above-mentioned studies, it was determined in the present study that *G. lividus* mushroom had a lower TAS value. It was determined that the TOS value of *G. lividus* mushroom was higher than that of *P. limonella* and lower than that of *C. cylindracea*. It was also found that *G. lividus* mushroom had higher OSI values when compared to the mushrooms studies in the above-mentioned studies. It was thought that the differences in antioxidant and oxidant capacities between the mushrooms were due to the differences between mushroom species. It was determined that *G. lividus* mushroom inhibited oxidant compounds better than *P. limonella* and *C. cylindracea* mushrooms, while inhibited the same compounds lower than *A. auricula* and *T. versicolor* mushrooms. Thus, it was determined that *G. lividus* mushroom exhibited antioxidant potential. It was also determined that the mushroom had normal oxidant compound levels. However, due to its high oxidative stress levels, it was advised to consume the mushroom with care.

Conclusion

In the present study conducted to determine the antioxidant potential of *G. lividus* mushroom, the mushroom was determined to have antioxidant potential. Also, limited consumption of *G. lividus*, an edible mushroom, collected in Burdur province was advised due to its high oxidative stress levels.

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