

Antioxidant activity of some wild mushrooms of Kashmir Valley

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Abstract

Earlier mushrooms were consumed mainly for their palatability and unique flavours, but their use as to meet specific nutrient requirements and medicinal purposes is recent one. Pharmaceutical substances with potent and unique health enhancing properties have been isolated from a number of medicinal mushrooms. The modern research support that mushrooms consists of a valuable source of biologically active compounds having significant antioxidant activity and protecting cellular DNA from oxidative damage. The present communication involves the evaluation of antioxidant potential of some mushrooms viz. *Coprinus plicatilis*, *Lentinus tigrinus*, *Ganoderma applanatum*, *Helvella crispa* and *Flammulina velutipes* growing wild in Kashmir. Among them *Lentinus tigrinus* proved to be having highest antioxidant potential where as *Helevella crispa* with least antioxidant potential, but all the selected species of mushroom come out with more or less positive results.

Introduction

Mushrooms have been used as medicine since Neolithic and Paleolithic eras²⁰. The wild edible mushrooms comprise a vast and yet largely untapped source of powerful new pharmaceutical products⁴. Several active principals of mushrooms have been used in health care for treating simple and age old common diseases like skin disease to present day complex and pandemic disease like AIDS and cancer²⁴⁸⁷¹¹¹⁷³²¹. Recent findings indicate that mushrooms are valuable source of biologically active compounds with potential of protecting cellular DNA from oxidative damage, such protective compounds have possible commercial value as dietary supplements for offsetting adverse biological effects associated with coronary heart diseases, cancer and age related neurodegenerative diseases⁵. They might also facilitate the development of treatments for the repair of indiscriminate cellular DNA damage that occurs during certain forms of chemotherapy and radiotherapy². The mushrooms are known as rich source of antioxidants which protects our body from toxic effects of free radicals responsible for damaging all components of the body viz. Lipids, proteins, DNA, sugars and are responsible for many types of mutation and cancer¹⁸¹⁶¹. Shi et al.,²³ reported that *Agaricus bisporus* has significant antioxidant activity, and the compound assigning this property to the species is tyrosinase. Mau et al.,¹⁴ analysed the antioxidant activity of ear mushrooms and recommended its use for inhibiting the activity of oxidases. Compounds, like Tocopherol, butylated hydroxytoluene (BHT), catechol are commonly used antioxidants, but use of these synthetic antioxidants proved to be having adverse effects such as toxicity and carcinogenicity²⁷. Due to certain limitations of synthetic antioxidants, usage of natural antioxidants has been recommended and mushrooms constitute the best choice²³¹⁹. Last 2-3 decades have seen steady expansion in the use of mushroom derived preparations for reducing the effect of spontaneously produced oxidative compounds in our body. The Present study was carried out to evaluate the antioxidant activity of some wild mushrooms collected from different sites/areas in Kashmir valley.

Materials and Methods

The mushroom species were collected from different sites of Kashmir Himalaya and were cleared to remove any residual compost/soil and dried subsequently (sun dry followed by oven dry at 45°C for 3 hours). All the dried specimens were ground to fine powder (0.1mm in size) and stored in air-tight plastic bags in a desiccators at room temperature for further analysis. The antioxidant activity was determined by DPPH (1,1-diphenyl-2-picrylhydrazyl) method given by Hatano et al.⁹. Catechol was taken as control.

Procedure: 10gms of catechol were dissolved in 10ml of 70% ethanol. 10gms of fresh wild dried mushroom powder were homogenised in 70% ethanol. The homogenate was placed on a magnetic stirrer for 2 hours at 4°C. The mixture was centrifuged in a cooling centrifuge at 10,000 rpm for 20 minutes. The supernatant was concentrated by using vacuum evaporator. Different series of concentrations of the extract were taken in test tubes and to each tube were added one ml of DPPH solution. After few minutes of incubation at room temperature readings were recorded at 517nm on a spectrophotometer²². The percent inhibition shown by different mushroom extracts at different concentrations was calculated by using the formule

$$\text{Percent inhibition} = \frac{1 - (\text{Absorption of sample})}{(\text{Absorption of control})} \times 100$$

Results and Discussion

After following the above mentioned procedure for estimating the antioxidant activity of the selected mushrooms, the results obtained are indicated in the Table 1.

Mushroom	Percentage inhibition					
	100µg/ml	200µg/ml	300µg/ml	400µg/ml	500µg/ml	600µg/ml
<i>Coprinus plicatilis</i>	45.32 ± 1.154	60.40 ± 0.262	63.74 ± 0.282	70.25 ± 0.212	72.71 ± 0.033	78.91 ± 0.430
<i>Lentinus tigrinus</i>	50.58 ± 1.217	50.58 ± 0.266	52.77 ± 0.217	70.81 ± 0.228	84.54 ± 0.373	84.23 ± 0.252
<i>Ganoderma applanatum</i>	35.11 ± 1.217	44.58 ± 0.194	56.37 ± 0.159	62.89 ± 0.212	80.35 ± 0.317	84.44 ± 0.254
<i>Helvella crispa</i>	56.10 ± 0.251	47.51 ± 0.194	59.48 ± 0.111	66.75 ± 0.175	83.44 ± 0.510	85.45 ± 0.455
<i>Flummulina velutipes</i>	14.51 ± 1.138	25.21 ± 1.133	47.55 ± 0.510	51.48 ± 1.016	59.24 ± 0.127	64.23 ± 0.146
Catchol (control)	41.49 ± 1.425	58.77 ± 0.194	72.55 ± 0.250	79.11 ± 0.238	89.02 ± 0.251	92.08 ± 0.257

Table 1- Antioxidant activity of some wild mushrooms of Kashmir Valley.

*mean of five replicates.

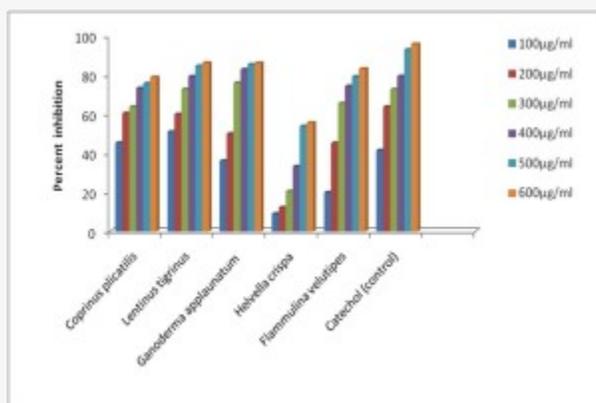


Fig. 1: Graphical representation of antioxidant activity of some wild mushrooms of Kashmir Valley.

It is quite evident from the the results (Table 1) that mushroom extract at all the concentrations showed antioxidant activity. The maximum antioxidant activity was found at highest concentration (600µg/ml and 500mg/ml) followed by lower concentrations 400µg/ml, 300µg/ml, 200µg/ml and 100µg/ml sequentially, when compared to control (catchol) which showed the similar trend in all its concentrations. However, Different concentrations of catechol showed either higher or lower anti oxidant activity as compared to different concentrations of mushroom extract. Amongst all the mushroom species tested for antioxidant activity, *Lentinus tigrinus* showed higher antioxidant activity followed by *Ganoderma applanatum*, *Coprinus plicatilis*, *Flummulina velutipes* and *Helvella Crispa* respectively. In case of *Lentinus tigrinus*, the antioxidant activity varies from 86.24% to 50.98% in different concentrations of mushroom extract, similarly in *Ganoderma applanatum*, *Coprinus plicatilis*, *Flummulina velutipes* and *Helvella crispa* the antioxidant activity varies from 86.14% to 36.11%, 78.91% to 45.35%, 83.24 to 19.19% and 55.55% to 9.0% in different concentration of mushroom extracts respectively.

Naturally occurring antioxidant components, including ascorbic acid and phenolics have been reported in most of the mushrooms²⁸, Thus antioxidant activity of mushrooms might be due to antioxidants such as phenolics and ascorbic acid²⁶¹⁵⁶. Triterpenoides has been identified as the main chemical compounds in *Ganoderma lucidium* responsible for antioxidant activity¹⁹²⁹ similar compounds may be present in the *Ganoderma applanatum*. Teows²⁵; Shi et al.²³ Lakshmi et al.¹²¹³ Jayakumar et al.¹⁰ also worked out the antioxidant activity of number of wild mushrooms and reported mushrooms as one of the best sources of antioxidants.

Conclusion

It is therefore clear from the results that all the species of mushrooms selected for screening of their antioxidant potential at at different concentrations of extract showed significant antioxidant activity, but higher concentration showed much more

antioxidant activity followed by lower concentrations of mushroom extracts. Since some of the selected mushrooms like *Lentinus tigrinus* and *Flammulina velutipes* are commonly used edible mushrooms, Therefore, the present finding encourages their use in human diets, which in turn might serve as possible protective agents to help humans to reduce oxidative damage.

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