



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.

Key words: Mushrooms, Antioxidant activity, Wild, Kashmir Valley.

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INTRODUCTION

Mushrooms have been used as medicine since Neolithic and Paleolithic eras (Samorini, 2001). The wild edible mushrooms comprise a vast and yet largely untapped source of powerful new pharmaceutical products (Chang and Miles, 2004). 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 cancer (Tam *et al.*, 1986; Gruen and Wong, 1982; Gareth, 1990; King, 1993; Oso, 1997; Chang and Buswell, 1996; Sharma, 2008). 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 diseases (Cheung and Cheung, 2005). They might also facilitate the development of treatments for the repair of indiscriminate cellular DNA damage that occurs during certain forms of chemotherapy and radiotherapy (Buswell and Chang, 2002). 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 cancer (Przybytniak, *et al.*, 1999; Ohtsuka *et al.*, 1997; Borchers *et al.*, 1999). Shi *et al.*, (2002) reported that *Agaricus bisporus* has significant antioxidant activity, and the compound assigning this property to the species is tyrosinase. Mau *et al.*, (2001) 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 carcinogenicity (William *et al.*, 1999). Due to certain limitations of synthetic antioxidants, usage of natural antioxidants has been recommended and mushrooms constitute the best choice (Shi *et al.*, 2002; Russel and Peterson, 2006). 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.

MATERIAL 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.* (1988). 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 spectrophotometer (Shimada *et al.*, 1992). The percent inhibition shown by different mushroom extracts at different concentrations was calculated by using the formula

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

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**.

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



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

Mushroom	Percentage inhibition					
	*100µg/ml	200µg/ml	300µg/ml	400µg/ml	500µg/ml	600µg/ml
<i>Coprinus plicatilis</i>	45.35 ±0.154	60.46 ±0.262	63.74 ±0.282	73.29 ±0.212	75.71 ±0.199	78.91 ±0.430
<i>Lentinus tigrinus</i>	50.98 ±0.217	59.98 ±0.366	72.77 ±0.201	79.31 ±0.288	84.69 ±0.373	86.24 ±0.232
<i>Ganoderma applanatum</i>	36.11 ±0.217	49.96 ±0.391	76.01 ±0.196	82.88 ±0.275	85.46 ±0.317	86.14 ±0.268
<i>Helvella crispa</i>	9.0 ±0.220	12.21 ±0.594	20.48 ±0.334	33.25 ±0.275	53.90 ±0.541	55.55 ±0.355
<i>Flammulina velutipes</i>	19.91 ±0.258	45.20 ±0.243	65.55 ±0.500	74.38 ±0.306	79.28 ±0.321	83.24 ±0.194
Catechol (control)	41.49 ±0.425	63.77 ±0.494	72.66 ±0.290	79.43 ±0.288	93.02 ±0.261	95.93 ±0.237

*mean of five replicates

antioxidant activity, *Lentinus tigrinus* showed higher antioxidant activity followed by *Ganoderma applanatum*, *Coprinus plicatilis*, *Flammulina 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*, *Flammulina 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 mushrooms (Yim, et al., 2009), Thus antioxidant activity of mushrooms might be due to antioxidants such as phenolics and ascorbic acid (Velioglu, et al., 1998; Mau et al., 2004; Ferreira et al., 2007). Triterpenoids has been

identified as the main chemical compounds in *Ganoderma lucidium* responsible for antioxidant activity (Russel and Paterson, 2006; Zhou, et al., 2007) similar compounds may be present in the *Ganoderma applanatum*. Toeow (1997); Shi et al. (2002); Lakshmi et al. (2004, 2007); Jayakumar et al. (2007) 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 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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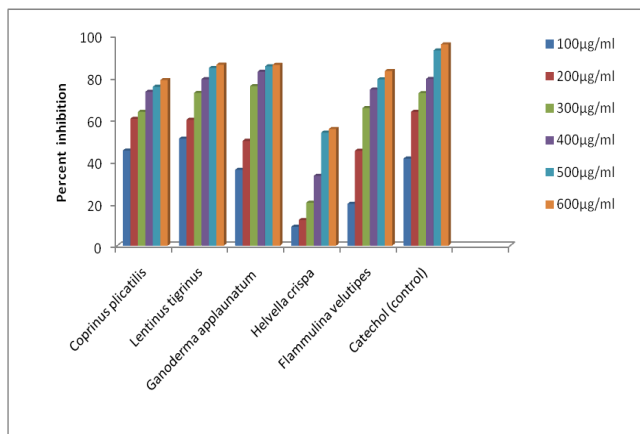


Figure. 1. Graphical representation of antioxidant activity of some wild mushrooms of Kashmir Valley.

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