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Potential antioxidant activity of some mushrooms growing in Kashmir Valley

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Abstract

In the present study some mushrooms were collected from different sites/forest areas of south Kashmir and then were evaluated for antioxidant activity. It was revealed from the study the all the concentrations of tested mushrooms showed antioxidant activity. However, the highest antioxidant activity was observed at highest concentration of mushroom extracts. It was followed by lower concentrations of mushroom extract. *Sarcoscypha coccinia* showed highest antioxidant activity followed by *Cantharella cibarius, Bovista plumbe*a, *Coprinus comatus* and *C. atramentarius* respectively. All the extracts of mushrooms showed positive correlation with standard oxidant, catechol. The antioxidant activity of mushroom extracts was either lower or higher than the antioxidant activity of catechol.
Key words: Antioxidant activity, concentrations, catechol, mushrooms, percent inhibition.

Introduction

Mushrooms are rich sources of proteins, vitamins and minerals (Lintzel, 1941; Aletor, 1995; Chanig & Buswell, 1996). They are also known to have antioxidant activity (Ohtsuka *et al*., 1997, Jones and Jonardhan, 2008). Antioxidants are chemical compounds which protect cells from damage by free radicals. These free radicals are capable of damaging all components of body viz, lipids, proteins, DNA and sugars (Halliwell and Gutteridge, 1984; Chang and Hayes, 1978). The Kashmir Himalaya provides a rich habitat for mushroom growth. Mushrooms which grow wild in Kashmir have not been explored fully for antioxidant activity and other medicinal properties. Therefore, an attempt was made to carry out the antioxidant activity of some wild mushrooms collected from forests and planes of southern Kashmir which has not received much attention.

Materials and Methods

For the present study, samples of five mushroom species, viz. *Bovista plumbea* Pers., *Cantherellus cibarius* Fr., *Coprinus atramentarius* Bull. ex. Fr., *C. comatus* (Mull.) Pers. and *Sarcoscypha coccinea* (Scop.) Pers. were collected from different field sites of southern Kashmir. These samples of mushrooms were brought to the laboratory and identified on the basis of morphological, reproductive and other characteristics. Final identification was done by comparing the recorded characters of mushroom species with standard field guides by Largent (1973) and Simon and Schuster (1998) and after comparing with mushroom hebaria of Sheri Kashmir University of Agricultural Science and Technology-Kashmir, Regional Research Laboratory, Srinagar and National Research Centre for Mushroom, Solan, Himachal Pradesh, India. Thereafter antioxidant activity of these mushrooms was determined by DPPH (2, 2-diphenyl-2-picrylhydrazl) method given by Hatano *et al*. (1988). To observe the antioxidant activity of these mushrooms, all the procured, selected and dried species of edible mushrooms were cleaned to remove any residual compost/soil and subsequently air dried in the oven at 50^{o}C for 3h. All the dried mushrooms were ground to fine powder (ca. 1mm size) and stored in air tight dessicator at room temperature for further analysis. Then 10 grams of each of dried mushroom powder were homogenized in 70% ethanol. The homogenate was stirred on a magnetic stirrer for 2h at 4^{o}C. The mixture was centrifuged in a cooling centrifuge at 10,000rpm for 20 minutes. The supernatant was concentrated by using the vacuum evaporator. The catechol was taken as control. 10g of catechol was dissolved in 70% alcohol. Different concentrations (20 mg **%** ethanol) of the mushroom extract were taken in the test tubes and to each tube one ml of DPPH (2,2-diphenyl-2-picrylhydrazl) solution was added. After few minutes of incubation at room

temperature readings were recorded at 517nm spectrophotometrically. The percent inhibition over DPPH (2, 2-diphenyl-2-picrylhydrazl) radical shown by different mushroom extracts at different concentrations was calculated by using the formulae:

$$\text{Percent inhibition} = \frac{\text{1-absorption of sample at 517nm}}{\text{absorption of control at 517nm}}$$

Results and Discussion

It was revealed from the results (Table 1, Fig. 1-5) that all the concentrations of the mushroom extract and catechol (control) showed antioxidant activity. However, the maximum antioxidant activity was observed at highest concentration (600µg/ml) followed by lower concentrations such as 500µg/ml, 400 µg/ml, 300µg/ml and 100µg/ml respectively. *Sarcoscyphae coccinea* showed highest antioxidant activity. It was followed by *Cantharellus cibarius, Bovista plumbea, Coprinus comatus* and *C. atramentarius* respectively. The antioxidant activity in case of *S. coccinea* varies from 89.90% to 38.72% in different cocentration of mushroom extract whereas in case of *Cantharellus cibarius* the antioxidant activity varies from 86.27% to 51.65% in different concentrations of mushroom extract. In case of *Bovista atramentarius*, the antooxidant activity varies from 82.50% to 48.35% and in *C. atramentarium* the antioxidant activity varies from 82.45% to 21.45% in different concentrations of mushroom extract respectively. Likewise, the antioxidant activity in difernt concentrations of *C. comatus* the antioxidant activity varies from 58.50% to 10.75% respectively. The antioxidant activity showed positive co-relation with antioxidant activity of catechol. In case of catechol the antioxidant activity was highest at highest concentration followed by lower concentrations. However, antioxidant activity of catechol showed both increase and decrease as compared to mushroom extracts at different concentrations. The antioxidant activity of mushroom extracts might be due to phenolics and other secondary metabolites accumulated by mushroom (Li *et al*., 2005; Vehoglu *et al*., 1998 and Oyetayo *et al*., 2007). Antioxidant activity of some mushrooms have been carried by Mau *et al*. (2001) and Russel and Paterson (2006). Zhow *et al*. (2007) also reported antioxidant activity of *Gamoderma lucidum*. It is also suggested that mushroom rich in antioxidant activity have been shown to play an important role in prevention of cancer (Bahl, 1983; Wasser and Weig 1999; Kidd, 2000; Feng *et al*., 2002).

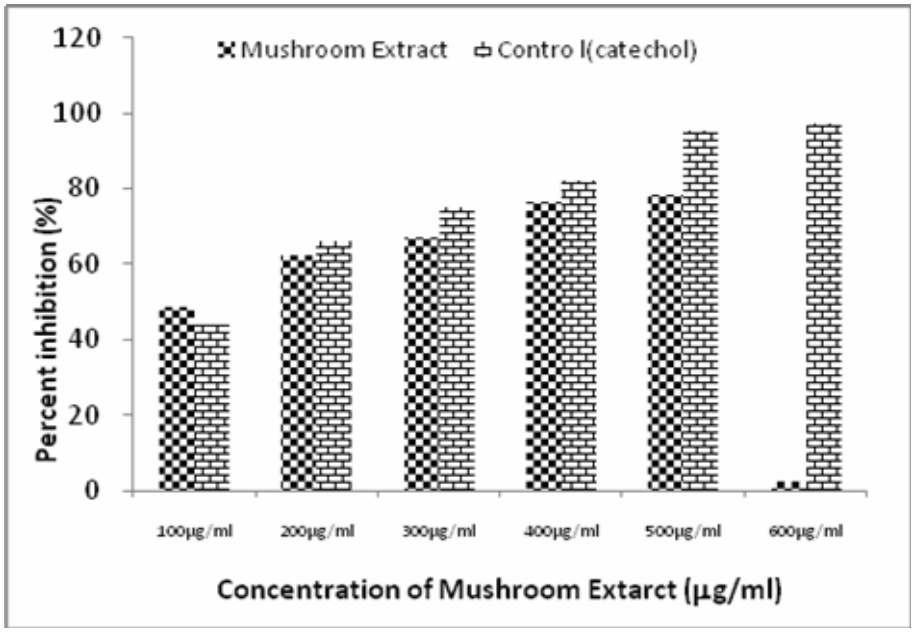

Fig. 1: Antioxidant activity of *Bovista plumbea.*

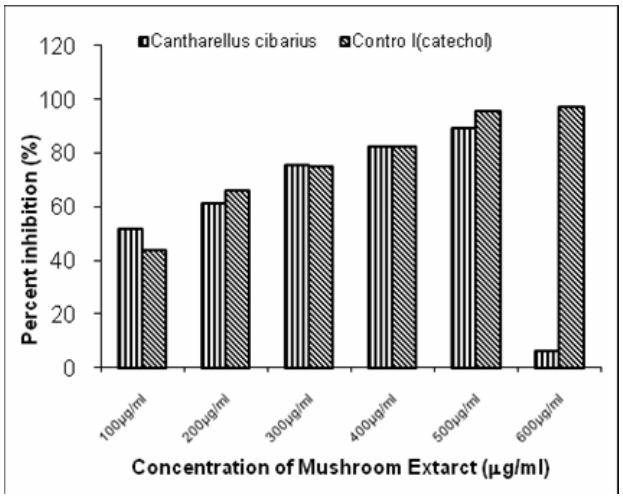

Fig. 2: Antioxidant activity of *Cantharellus cibarius.*

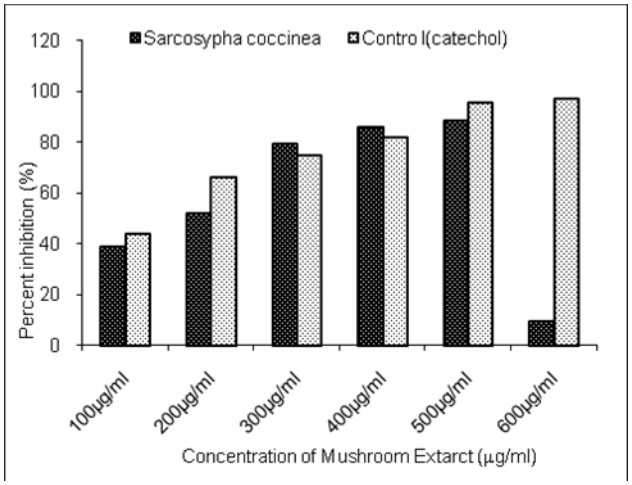

Fig. 3: Antioxidant activity of *Sarcosypha coccinea.*

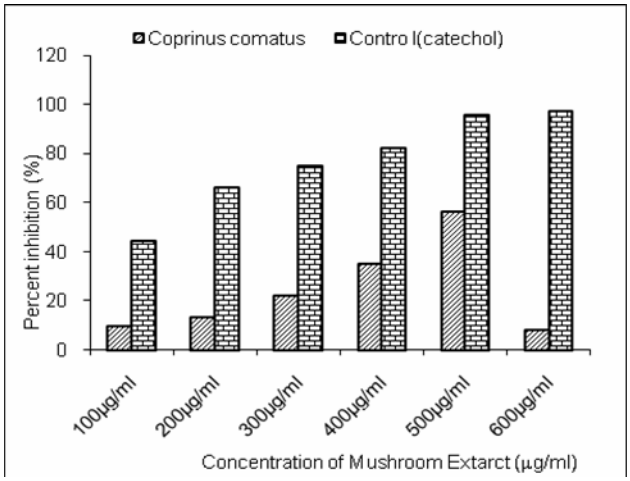

Fig. 4: Antioxidant activity of *Coprinus comatus.*

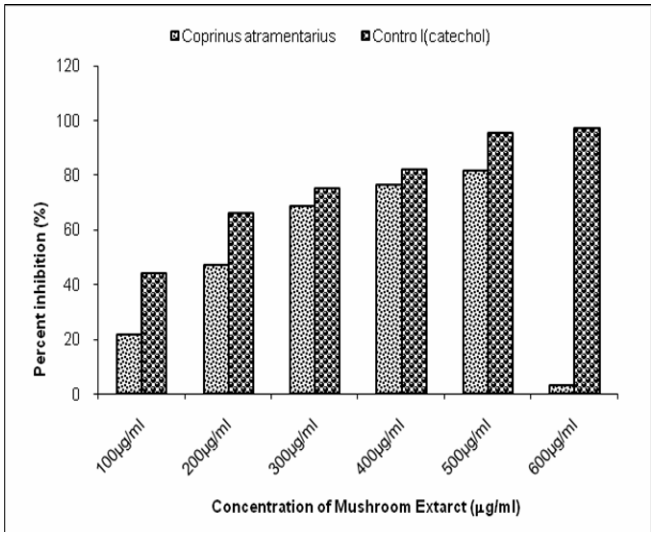

Fig. 5: Antioxidant activity of *Coprinus atramentarius.*

Table 1: Antioxidant activity of some mushrooms in Kashmir Valley.

Mushroom species	**Percent inhibition (%) in different concentrations of mushroom extract**					
	100µg/ml	**200µg/ml**	**300µg/ml**	**400µg/ml**	**500µg/ml**	**600µg/ml**
Bovista plumbea	48.70±0.360	62.22±0.203	67.24±0.832	76.36±0.128	78.59±0.234	82.59±0.485
Cantharellus cibarius	51.80±0.148	61.30±0.114	75.58±0.097	82.27±0.096	89.38±0.025	86.23±0.099
Sarcosypha coccinea	38.79±0.054	51.91±0.086	79.38±0.025	85.85±0.128	88.47±0.592	89.90±0.101
Coprinus comatus	9.77±0.539	13.46±1.118	22.25±0.239	35.24±0.824	56.06±1.294	58.50±0.707
Coprinus atramentarius	21.63±0.084	47.31±0.355	68.62±0.202	76.52±0.447	81.63±0.487	82.45±0.36
Control (catechol)	44.08±0.695	66.21±0.23	75.00±0.127	82.24±0.151	95.63±0.100	97.23±0.064

Mean of five replicates
Values in parenthesis are values for standard error (S.E).

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