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Original Research Article

Comparison of Bioactive Compounds and Enzymatic Antioxidant found in White Button Mushroom and Oyster Mushroom

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Keywords

Mushroom, Bioactive compound, Enzymatic antioxidant

A B S T R A C T

Mushroom is a fungi belonging to basidiomycetes family. It is used for several purposes such as medicine, food and sweets. The present work was started with an aim to compare the bioactive compounds namely (protein, total phenol, total carotenoid, total flavonoid), of different types of mushroom. The results showed that white button mushroom had highest amount of protein content (4.93±0.12 µg g^{-1}). Maximum content of flavonoids (5.41±0.15 mg/100g) was observed in the oyster mushroom (paddy straw). Total phenol content was highest (16.21±0.44 mg/100g) in oyster mushroom (paddy straw). Highest amount of total carotenoids (16.21±0.44 mg/100g) was seen in oyster mushroom (paddy straw). The enzymatic antioxidant polyphenol oxidase was observed to be highest (31.74±3.49 m mol $min^{-1}g^{-1}fw$).

Introduction

A mushroom is as "a macrofungus with a distinctive fruiting body which can be either epigeous or hypogeous. The macrofungi have fruiting bodies large enough to be seen with the naked eye and to be picked up by hand" Most mushroom species are under the Basidiomycota and Ascomycota, the two phyla under the kingdom fungi (Kang *et al.*, 2004). A bioactive compound is a compound that has effect on any living organism, tissue or cell. In the field of nutrition bioactive compound is distinguished from essential nutrients while nutrients are essential for sustainability of body. Bioactive compounds are not essential since the body can function properly without them, or because nutrients fulfil the same function. Bioactive compounds are extra nutritional constituents that typically occur in small quantities in food and can influence the health of living beings. Some examples of bioactive compounds are flavonoids, caffeine, carotenoids, carnitine, choline, coenzyme Q, creatine, dithiones, phytoesterols, phytoestogens, glucosinolates, polysaccharides, prebiotics, anthocyanins, polyphenols, polyphenols, anthocyanins, prebiotics,and taurine (Kaviyarasan *et al.*, 2014).The main bioactive components in mushroom are phenolic compounds, ascorbic acid, β-carotene, flavonoids and lycopene (Patel *et al*., 2012). They have received an incredible interest in recent decades with the realization that these are good sources of delicious food with excellent flavor, aroma,

exotic tasteful appeal and high nutritional traits because they contain good quality proteins, unsaturated fatty acids, minerals and vitamins (Hussein *et al*., 2015). The wild mushrooms provide a significant source of nutrients that can be used as food or in traditional medicine (Janpoor *et al*., 2016). Antioxidants are the scavengers of free radicals and are believed to help the body fight chronic diseases (Peter *et al*., 2014).

Materials and Methods

Investigations of bioactive compounds

Estimation of protein content: Protein was estimated by the method of (Lowry *et al*., 1951) by using BSA as standard protein. Using a calculation curve, the results were expressed in µg/ml. Estimation of total phenols: Total phenol content in the samples was estimated by the method of Hossain *et al*., (2013). The total phenols g-1 tissue was calculated from the standard graph. Estimation of Flavonoids: Flavonoid content in mushroom was estimated according to the method given by Chang *et al.,* (2012). Flavonoid content was expressed in term of Quercetin equivalent (mg /g of extracted compound). Estimation of carotenoids: The carotenoid content in mushroom was estimated according to the method given by Moore *et al.,* (2003). The carotenoid content (mg ml^{-1}) in the sample was calculated using a calibration curve prepared using standard high purity β-carotene. 1.2 Assays of enzymatic antioxidants Assay of polyphenol oxidase:Polyhenol oxidase was assayed by method of Liu *et al.,* (2007). Assay of Guiacol peroxidise. The activity of guiacol peroxidase was measured following Kato and Shimizu (1987) using a modification of the procedure of Curtis (1971). Assay of Ascorbate peroxidise Ascorbate peroxidase was assayed according to the method of Nakano *et al.,* (1981). Assay of glutathione reductase Glutathione reductase was assayed by method of Starlin and Gopalkrishnan (2013).

Results and Discussion

The highest protein content was observed in white button mushroom (4.93±0.12 µg g^{-1}) followed by oyster mushroom (paddy straw) (3.89±0.11 µg g^{-1}). Ogoke *et al.,* (2015) reported significantly highest protein content in white button mushroom. Therefore, results of the present study are in agreement with the past studies done by various workers. The highest phenol content was observed in oyster mushroom (paddy straw) (16.21±0.44 mg/100g) followed by white button mushroom (15.24±0.54 mg/100g). Kaviyarasan *et al.,* (2014) reported significantly highest phenol content is in oyster mushroom (paddy straw). Therefore, results of the present study are in agreement with the past studies done by various workers. The highest carotenoid content was observed in oyster mushroom (paddy straw) (74.61±0.21 mg/100g) followed by white button mushroom (72.66±0.22 mg/100g). McGowan (2001) reported significantly highest carotenoid content in oyster mushroom (paddy straw). Therefore, results of the present study are in agreement with those reported by other workers. The highest flavonoid content was observed in oyster mushroom (paddy straw) (5.41±0.15 mg/100g) followed by white button mushroom (3.46±0.19 mg/100g). Arthy *et al.,* (20014) reported significantly highest flavonoid content in oyster mushroom (paddy straw) (Table 2). Therefore, results of the present study are in agreement with the past studies done by various workers. Valko *et al.,* (2007) reported significantly highest polyphenol oxidase activity in white button mushroom. Therefore, results of the present study are in agreement with the

studies done by the various workers. Akpaja *et al.,* (2003) reported significantly highest guiacol peroxidase activity in white button mushroom. Therefore, the results of present study are in agreement with the studies done by the various workers. Yue *et al.,* (2012) reported significantly highest Ascorbate peroxidase activity in white button mushroom. Therefore, results of the present study are in agreement with the past studies done by the various workers. Wasser *et al.,* (1999) reported significantly highest Glutathione reductase activity in white button mushroom. Therefore, results of the present study are in agreement with the past studies done by various workers (Table 1).

Table.1 APX, PPO, GR, GPX activity in selected mushroom species

S. No.	Selected Mushroom	PPO (m mol $min^{-1}g^{-1}$ fw)	APX (m mol $min^{-1}g^{-1}$ fw)	GR (m mol $min^{-1}g^{-1}$ fw)	GPX (m mol $min^{-1}g^{-1}$ fw)
1.	White Button Mushroom	31.74±3.49	10.07±2.17	15.95±0.47	20.18±0.27
2.	Oyster mushroom (paddy straw)	29.43±3.11	9.09±2.11	14.87±0.41	19.11±0.22

Table.2 Content of bioactive compounds in selected mushroom species

S. No	Selected Mushroom	Protein (µg g^{-1})	Total Phenols (mg/100g)	Total Carotenoids (mg/100g)	Total Flavonoids (mg/100g)
1.	White Button Mushroom	4.93±0.12	15.24±0.54	72.66±0.22	3.46±0.19
2.	Oyster mushroom (paddy straw)	3.89±0.11	16.21±0.44	74.61±0.21	5.41±0.15

On the basis of above investigations it can be concluded that when oyster mushroom is grown on paddy straw it is rich in totalphenol, carotinoid and flavonoid, thus it can be said to be nutritionally significant. At the same time white button mushroom is a rich source of protein

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