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RESEARCH ARTICLE

Phytochemical and antioxidant activity of *Pleurotus ostreatus* (Oyster mushroom)

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ABSTRACT

The present study is carried out to analyze the phytochemical and antioxidant activity present in *Pleurotus ostreatus* (oyster mushroom). This study assessed the presence of Alkaloids, Flavonoids, Saponins, Phenols and Tanins. Also aqueous extract of the mushroom was used to analyse the antioxidant capacity. Overall study revealed the significant activity of the mushroom and could be used as a good source of medicine.

Keywords: *Pleurotus Ostreatus*, Saponins, Antioxidant

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1. Introduction

Mushrooms have been used as a food and flavouring material in soups and sauces for centuries because of its unique flavour. It consists of high amount of proteins, carbohydrates, fibres and very low amount of cholesterol content [1]. Also it is rich in vitamins as well as minerals. It consist of rich medicinal value and is being used as a powerful agent as antitumor, antibacterial, antiviral and in immunomodulating treatments. It possess antioxidant capacity and it has been used as a rich supplement in food and pharmaceutical industry and in pharmaceutical industry [2]. The genus *Pleurotus* consist of around 40 species and it is commonly known as oyster mushroom. They are commonly found both in temperature and tropical parts of the world and it is the second most commonly cultivated mushroom in the world. It is rich in concentration of cysteine, methionine, and aspartic acid and also considered as good therapeutic agents [3].Oyster mushroom rich in nutrients like fiber, carbohydrates, minerals and vitamins also rich in antioxidant activity. It also holds bioactive components like lectins and nucleotides which trigger the immune system and human metabolism [4].It is widely studied in many parts of the world as they are rich in

gastronomic value, they are able to colonize and degrade a large group of lignocellulosic residues [5].

Oxidative stress rises in a biological system due to over exposure of oxidants and decrease in the antioxidant capacity of the cell. This is linked with the generation of reactive oxygen species (ROS) like free radicals and it associates strongly with the Pathophysiology of diseases like cancer, rheumatoid arthritis, aging and inflammation. Exogenous sources like exposure to pollutants, ionizing irradiation and oxygen derived radicals are responsible for the oxidation which results in cell death and tissue damage [6]. This study involves the phytochemicals and antioxidant activity of the mushroom species Pleurotusostreatus. Antioxidant enzymes SOD, CAT, vitamin C were analyzed.

2. Materials and Methods

Mushroom extract: The mushroom was collected from local stores in Coimbatore district, Tamil Nadu, India. The fruiting bodies were washed with deionized water and shade dried and then finely powdered. 1.0g of powder was homogenized with 2.0 mL of 0.1M Tris-HCl buffer (pH 7.4). The samples were centrifuged at 4°C and the supernatant was collected and was used for the estimation.

Analysis of Phytochemicals

The mushroom extract was subjected to qualitative tests adopting standard procedures for the determination of the phytochemicals [7]

Assay of Antioxidant Activity

Determination of Superoxide dismutase (SOD) activity

Reaction mixture consist of 1.1 ml of 50mmol phosphate buffer, 75µl of 20 mmol L-methionine, 40 µl tritonof 1% X-100, 75 µl of 10 mmol hydroxylamine hydrochloride and 100 µl of 50µM EDTA. To this 100 µl of the sample was added followed byincubation at 37 ^{O}C for 5 min then 80 µl of 50µM riboflavin was addedand the tubes were exposed to 200 W Philips fluorescent lamps for 10min. The control tube contained an equal amount of buffer instead of asample. The sample and its respective control were run together. At theend of the exposure, 1.0 ml of Greiss reagent was added to each tube and absorbance was measured at 543 nm. One unit of enzyme activity was defined as the amount of SOD capable of inhibiting 50 % of nitrite formation under assay condition [8].

Determination of catalase (CAT) activity

In a test tube 0.9 ml of 0.01M phosphate buffer, 0.1 ml of sample extract and 0.4ml of 0.2M H2O2 was added then 2.0 ml of dichromate-acetic acid solution was added and tubes were kept inboiling water bath for 10 min, and the colour developed was read at620 nm at 0 and after 60 sec. Standards in the range of 1.2–6.0 µM were taken and processed as test and blank containing reagent alone. The activity of catalase was expressed as µmoles of H2O2 decomposed/min/mgprotein or ml of serum [9].

Determination of Vitamin C activity

Brominated sample extract of 0.1 mL was taken and was made to 3.0 mL by addition of distilled water. To that 1.0 mL of DNPH reagent followed by 1 to 2 drops of thiourea was added into each tube. A blank was set as above, but with water in place of ascorbic acid solution. The contents in the tube were thoroughly mixed in place of ascorbic acid solution. The contents in the tube were thoroughly mixed and incubated at 37 ^{O}C for 3 h and after incubation; tubes were kept in ice bath. Formed orange red ozazone crystals were dissolved by addition of 7.0 mL of 80 % H_2SO_4 drop wise while the tubes were still in the ice bath. The tubes were removed and allowed to stand at room temperature for 30 min and its absorbance was read at 540 nm. The amount of vitamin C is expressed as µb/b tissue [10].

3. Results and Discussion

The results of phytochemical analysis of *Pleurotus ostreatus* was depicted in table 1. Indicates the presence of flavonoids, tannins, saponins and steroids were not detected.

Table 1: Phytochemical analysis of aqueous extract of *Pleurotusostreatus*

Test	Aqueous Extract
Flavanoids	-
Tannins	+
Saponins	+
Steroids	-
Fatty acids	-
Terpenoids	+
Alkaloids	-

Phytochemical screening of the mushroom revealed the presence of tannins, saponins, terpenoids and absence of flavonoids, steroids, fatty acids and alkaloids. Phytochemicals are non-nutritive plant chemicals consist of protective effect or disease preventive properties [11]. There are many reports supporting the effect of phytochemical constituents and their activity against specific disease and Supporting to this study *Pleurotusostreatus* showed relevant phytochemical constituents [12]. The antioxidant activity was presented in table 2. Under normal physiological conditions the harmful effects of ROS are balanced by the antioxidant action. Antioxidants are substances that neutralize free radicals or their actions.

Table 2: Antioxidant activity of *Pleurotus ostreatus* fruting bodies

Mushroom	SOD	CAT	Vitamin C
Pleurotus	20.55±0.32	35.48±0.67	2.25±0.05

Values are expressed as mean ± SD; n = 3. Units: SOD: Inhibition of 50 % nitrite formation/min/ mg protein; CAT: µmoles of H_2O_2 decomposed/min/ mg protein.

Enzymatic and non-enzymatic antioxidants involved in the defense mechanism against dangerous effects of oxidative stress induced cell damage [13].Enzymatic antioxidant defence include superoxide dismutase (SOD), catalase (CAT) and nonenzymatic antioxidant is vitamin C. Antioxidant possess mechanisms as reducing activity, free radical-scavenging, potential complexing of pro-oxidant metals and quenching of singlet oxygen. Superoxide dismutase and catalase are two major scavenging enzymes

that remove the toxic free radical [14]. Vitamin C is a very effective free radical scavenger. It is an outstanding antioxidant in biological systems and powerful reducing agent [15]. Vitamin C acts as first line natural antioxidant and also essential free radical scavenger [16]. In the present study good activity of vitamin C was observed. Medicinal values of mushroom therefore attributed to the presence of these phytochemicals. Valuable pharmaceutical properties of mushroom attributes to have stimulating effects of pain reliever, tropical anaesthetic etc.

4. Conclusion

The present work reveals that mushroom *Pleurotus ostreatus*is a powerful antioxidant. Because of its medicinal value it has high impact in food industry and pharmaceutical industry.

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