

Pleurotus tuber-regium (Rumph. ex Fr.) Singer a potent source of antioxidant

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Abstract

Mushrooms have been used as traditional source of nutritional food and medicinal supplements. *P. tuber-regium* has been well known edible fungi and possess bioactive mycochemicals such as flavonoids, phenols, alkaloids, glycosides, proteins, fatty acids etc. and possess good antioxidant activity. Among estimated biochemicals alkaloid was found in high quantity ($28.14 \pm 0.32\text{mg}/100\text{g}$) and tannin in low quantity ($2.74 \pm 0.26\text{mg}/100\text{g}$). The mushrooms extract also possess good antioxidant potentiality. Estimated free radical scavenging activity was $8.98 \pm 1.02\%$, hydroxy radical scavenging activity was $10.85 \pm 0.73\%$ and total antioxidant capacity of the crude extract was $21.50 \pm 1.3\%$ at $100\mu\text{g}/100\text{mL}$ concentration of extract.

Key words: Mushroom, mycochemical, medicinal, antioxidant

Introduction.

In recent decades population explosion and its burden is directly associated with burden of communicable and noncommunicable diseases such as diabetes, renal, cardiovascular, respiratory, cancer and diseases associated with microbial infections [1,2]. Generation of oxidative agents or free radicals (Reactive oxygen and nitrogen species) are very high during pathogenic infections, injuries [3].

It has been found the generation of the oxidative species rapidly increasing due to recent pattern of lifestyle [4]. Free radical at high concentrations damage cellular and subcellular [5] and trigger generation of chronic disease and disorders such as Alzheimer's disease, Parkinson's disease, multiple sclerosis, ischemic heart disease, chronic renal failure, cancer etc. [6,7].

Traditionally mushrooms have been used as medicine as well as very good source of nutrient [8]. About 700 species of mushrooms have been reported for their significant therapeutic efficacy [9]. Medicinal mushrooms contain various mycochemicals such as tannins, alkaloids, flavonoids, phenolics etc., which associated with remedy of diseases and disorders. *Pleurotus tuber-regium* (Rumph. ex Fr.) Singer, commonly called king oyster mushroom, has been traditionally consumed as medicine and nutraceutical food supplement [10].

The aim of the present study was to evaluate proximate biochemical composition antioxidant activity of *P. tuber-regium*.

Material and Methods

Collection, identification and preparation of extract

Fresh fruiting bodies of *P. tuber-regium* were collected from different sites of Assam and were identified and brought to Department of Zoology, Ranchi University, Ranchi for preparation of extract. Fresh mushrooms were dried in shade, powdered and sieved. 50g of the fine powder was subjected to extraction chamber of Soxhlet using distilled water. *Mycochemical analysis*

Qualitative analyses of proximate biochemical present in the extract of *P. tuber-regium* were determined following Sofowara [11]. Quantitative estimation of traceable biochemicals was done following Dandapat *et al* [12].

Antioxidant activity

Antioxidant activity of *P. tuber-regium* extract was determined on the basis of total antioxidant activity [13,14], free radical scavenging [15] and hydroxyl radical scavenging activity [16] using standard methods.

Results and Discussion

Mycochemical analysis

The result of qualitative biochemical analyses of *P. tuber-regium* presented in table-1. The result biochemicals such as carbohydrates, glycosides, proteins, tannins, saponins, alkaloids, steroids, and lipids are present in extract of *P. tuber-regium*.

Previously preliminary biochemical analysis of edible white button mushroom *Agaricus bisporus* was done and presence of biochemical such as saponins, tannins, glycosides, reducing sugar, alkaloid, flavonoid, terpenoid etc. were reported [17].

Table 1: Qualitative biochemical analysis of *P. tuber-regium* extract

Mycochemicals	Present(+) or Absent (-)	Inference	Name of Test
Carbohydrate	+	Blue coloured solution was observed	Molish's Test
Glycosides	+	Green coloured complex was formed	Anthrone test
Protein	+	Blue coloured was observed	Bradford's test
Alkaloid	+	Orange colour was observed	Dragendroff test
Steroid	+	Steroid and H ₂ SO ₄ layers separated and sample layer forms cherry red colour and acid layer forms green colour	Salkowski test
Triterpene	+	Red colour was formed	Chloroform and Conc.H ₂ SO ₄ test
Flavonoid	+	Yellow colour formation was observed	NaOH test
Tannin		Yellow precipitate was observed	FeCl ₃ test
Lipid	+	Original colour of iodine disappeared	Iodine test
Saponin	+	Clear soap formation was observed	KOH test

Result of qualitative biochemical analysis of traceable mycochemical is presented in figure- 5. Among the mycochemicals alkaloid was found in high quantity ($28.14 \pm 0.32\text{mg}/100\text{g}$) and tannin in low quantity ($2.74 \pm 0.26\text{mg}/100\text{g}$). It has been reported other mushroom also contain $64.12 \pm 1.2\text{ mg/g}$ phenols, $0.016 \pm 0.001\text{ mg/g}$ flavanoid, $0.28 \pm 0.04\text{mg/g}$ saponins, $0.1 \pm 0.04\%$ alkaloids and $0.014 \pm 0.003\%$ tannins in *Tricholoma nudum* and $6.012 \pm 0.91\text{ mg/g}$ phenols, $0.031 \pm 0.02\text{ mg/g}$ flavanoids, $0.27 \pm 0.008\text{mg/g}$ saponins, $2.0 \pm 0.01\%$ alkaloids and $0.014 \pm 0.001\%$ tannins in *Psalliota campestris* and the biochemicals possess therapeutic efficacy [18]. Biochemicals such as phytophenols, flavonoids, tannins, saponins etc. are associated with reduction of reeradicals and decrease the risks of disease and disorders associated with oxidative stress [19-21].

Antioxidant activity

Antioxidant activity of *P. tuber-regium* was determined on the basis of free radical scavenging, hydroxyl radical scavenging capacity and total antioxidant activity of the mushroom extract. Results of antioxidant activity of *P. tuber-regium* are presented in figure-6, 7 and 8. BHA (Butylated Hydroxy Anisole) is a synthetic reducinh agent and its Freeradical scavenging cativity is quite higher than the extract. However, the extract also shows good freeradical scavenging activity. $100\text{ }\mu\text{g}/\text{mL}$ of extract showed highest freeradical scavenging activity ($8.98 \pm 1.02\%$) among the tested concentrations of extract. Hydroxy radical scavenging activity of extract was compared with ascorbic acid and found $100\text{ }\mu\text{g}/\text{mL}$ of extract showed highest ($10.85 \pm 0.73\%$) hydroxyradical scavenging activity among the tested extract but the ascorbic acid showed more effective scavenging activity ($68.11 \pm 2.46\%$). Total antioxidant capacity of the crude extract of showed very effective result. $100\text{ }\mu\text{g}/\text{mL}$ extract showed $21.50 \pm 1.3\%$ antioxidant activity equivalent to ascorbic acid when compared to same concentration of BHA ($65 \pm 1.5\%$ antioxidant activity). However $10\text{ }\mu\text{g}/\text{mL}$ extract did not show any activity. Antioxidant activity of *Pleurotus florida* and *Calocybe indica* studies and reported hydroxyl radical scavenging of extracts of *P. florida* and *C. indica* $65.41 \pm 0.65\%$ at $1000\text{ }\mu\text{g}/\text{ml}$ and $46.99 \pm 2.58\%$ at $1000\text{ }\mu\text{g}/\text{ml}$ respectively [22].

It has been reported antioxidant activity of plant and mushroom extracts are concentration dependent and the antioxidant activity depends upon the concentration of bioactive mycochemicals such as alkaloids, tannins, saponins, flavonoids, phenols etc. present in the fruiting body of mushrooms [23]. It has also been reported bioactive chemicals including primary and secondary metabolites of plant and mushroom origine posses reducing power and reduces the reactive oxygen and nitrogen species produce in the humanbody during pathogenic infections, so that they can act as source of good and safe antioxidants [24,25].

On the basis of above results it is concluded that *P. tuber-regium* can be used as fodder and used as potent source of antioxidant.

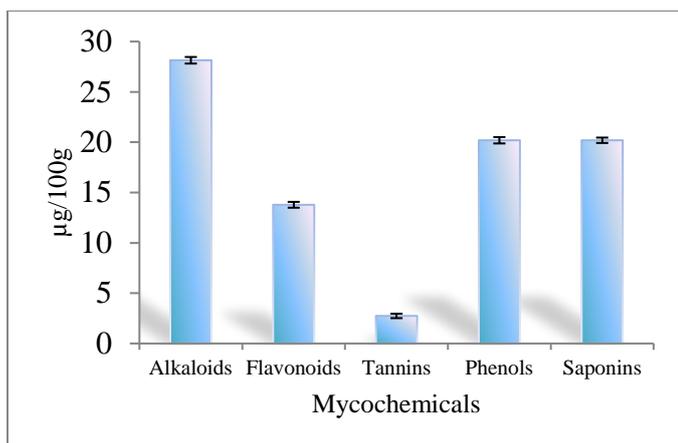


Figure 5: Qualitative analysis of traceable biochemical of *P.tuber-regium*

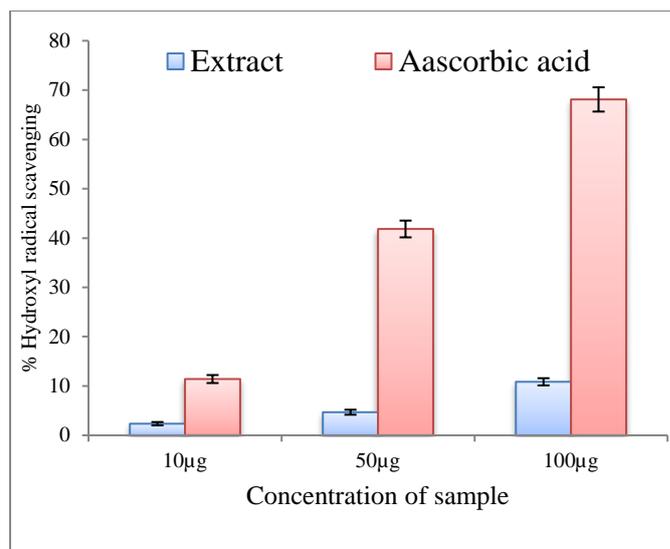


Figure 7: Hydroxyl radical scavenging activity of *P. tuber-regium*

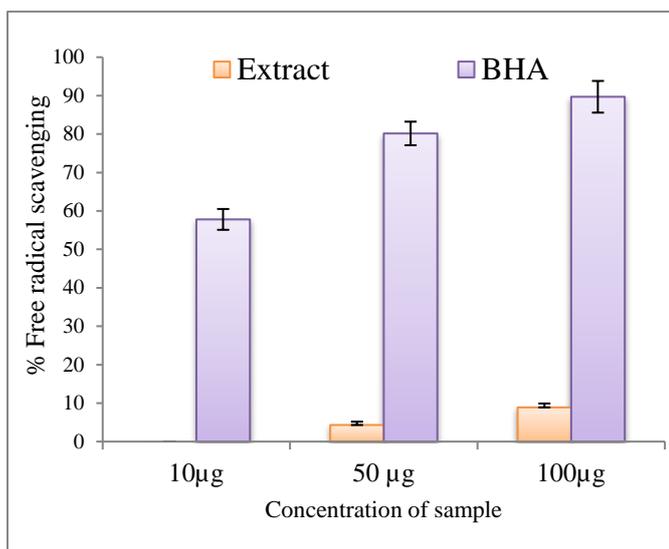


Figure 6: Free radical scavenging activity of *P. tuber-regium*

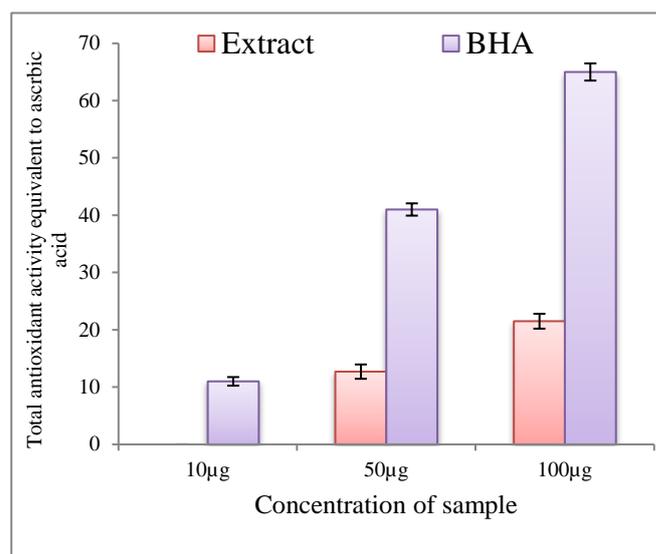


Figure 8: Total antioxidant capacity of *P. tuber-regium* extract

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