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# IN VITRO EVALUATION OF HYPOLIPIDEMIC AND ANTIOXIDANT ACTIVITIES OF METHANOLIC EXTRACT OF *SCHIZOPHYLLUM COMMUNE*

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**ABSTRACT**

The present study was undertaken to evaluate the in-vitro hypolipidemic and antioxidant activities of *Schizophyllum commune*. The mushroom was extracted using methanol and the obtained extract was subjected to preliminary phytochemical screening to identify the major bioactive constituents. The antioxidant activity of the extract was evaluated by DPPH radical scavenging assay, which determines the free radical scavenging ability of the extract. The hypolipidemic potential was assessed by pancreatic lipase enzyme inhibition assay using p-nitrophenyl butyrate as the substrate. The methanolic extract exhibited concentration-dependent antioxidant activity, as evidenced by an increase in DPPH radical scavenging activity with increasing extract concentration. The extract also demonstrated concentration-dependent inhibition of pancreatic lipase enzyme, indicating its potential to interfere with dietary lipid digestion. The observed activities may be attributed to the presence of bioactive constituents such as phenolic compounds, flavonoids, polysaccharides and other secondary metabolites. Overall, the findings suggest that *Schizophyllum commune* may serve as a promising natural source of antioxidant and lipid-metabolism-related bioactive compounds. Further studies involving isolation of active constituents and in-vivo evaluation are required to establish its pharmacological potential.

**KEYWORDS:** *Schizophyllum commune*, Hypolipidemic activity, Antioxidant activity, DPPH radical scavenging, Pancreatic lipase inhibition, Methanolic extract, Medicinal mushroom.

## INTRODUCTION

Dyslipidemia is a major metabolic abnormality characterized by elevated levels of total cholesterol, low-density lipoprotein cholesterol and triglycerides and/or reduced levels of high-density lipoprotein cholesterol. Persistent abnormalities in lipid metabolism are important risk factors for cardiovascular diseases and other metabolic disorders.[1] Dietary fat digestion is largely mediated by pancreatic lipase, which hydrolyses dietary triglycerides into absorbable fatty acids and monoacylglycerols. Therefore, inhibition of pancreatic lipase has been investigated as a strategy for reducing intestinal fat absorption and controlling excessive lipid accumulation.[2] Oxidative stress is another important factor associated with the development and progression of several chronic diseases. An imbalance between the production of reactive oxygen species and the body's antioxidant defense system can result in oxidative damage to lipids, proteins and nucleic acids.[3] Natural products containing phenolic compounds, flavonoids, polysaccharides and other bioactive molecules have attracted considerable attention because of their ability to scavenge free radicals and protect biological systems against oxidative damage.[4] Mushrooms have been

mostly used as a human food for centuries and have been famous for texture and flavour as well as having various medicinal properties. However, in recently emerged the mushrooms as being an important source of biologically active material that has medicinal value. Wildgrowing mushrooms contain a number of different secondary metabolites, carbohydrates, minerals, proteins, fibres, vitamins and fats that having antitumor, antifungal, antimicrobial and antioxidant property.[5] In the present studied, taken *Schizophyllum commune*, which belongs to basidiomycete, it completes life cycle in 10 days. The ecotype nature is saprobic on dead wood, which is growing alone or more frequently, in clustered way. It's widely distributed in through the world. The fruiting body of , approx. 15 cm wide, fanshaped when attached to the side of the log. The spore print depicts white colour.[6]

## MATERIALS AND METHODOLOGY

### COLLECTION AND AUTHENTICATION OF MUSHROOM

The fresh *Schizophyllum commune* are collected From natural habitat around from K, M Doddi, Mandya district, Karnataka, India. The collected material was authenticated by Dr. Thejesh kumar M P, HOD and Assistant professor, Department of Botany, Bharathi College, Bharathinagara, Maddur TQ, Mandya district, Karnataka, and was used for further experimental studies.

### PREPARATION OF *SCHIZOPHYLLUM COMMUNE* EXTRACT

The collected fruiting bodies of *Schizophyllum commune* were washed thoroughly with tap water to remove dust and adhering materials. The clean samples were shade-dried at room temperature until completely dried and suitable for coarse powdering. The dried material was then coarsely powdered using a mixer grinder and stored in an airtight container. About 31 g of the coarse powder was subjected to Soxhlet extraction using 70% methanol as the extraction solvent. The powdered material was placed in the thimble of the Soxhlet apparatus, and sufficient quantity of methanol was used as the solvent. The extraction was continued for approximately 6–8 hours until the solvent in the siphon tube became nearly colourless, indicating exhaustion of the extractable constituents. After completion of extraction, the solvent was evaporated by drying the filtrate in sterile Petri plates at room temperature, which yielded a semi-solid extract. The obtained extract was transferred into a clean, airtight container and stored under refrigeration until further experimental use.

### SOLUBILITY ANALYSIS

The solubility of extract was evaluated in various solvents such as water, DMSO, Chloroform, ethanol, methanol, ethyl acetate, and acetone to identify the most suitable vehicle for conducting *in-vitro* experiments.

### PHYTOCHEMICAL SCREENING[7,8]

Preliminary phytochemical screening of the extract was carried out to identify the presence of alkaloids, glycosides, flavonoids, carbohydrates, proteins, amino saponins, and phenolic compounds.

### ANTIOXIDANT ACTIVITY

#### DPPH (2,2-Diphenyl-1-picryl hydrazyl) free radical scavenging assay[9]

The antioxidant activity of the s.commune extract was assessed by the DPPH method, which is based on the reduction of the stable free radical 2,2-diphenyl-2picrylhydrazyl (DPPH). DPPH exhibits a deep violet color that turns yellow upon reduction to DPPH-H by hydrogen-donating antioxidants, with the decrease in absorbance indicating free radical scavenging potential. Different concentrations of the extract (20,100 µg/ml), prepared in water and the final volume was adjusted to 3 ml with DPPH. After thorough mixing, the reaction mixtures were incubated in the dark at room temperature for 20 minutes, and absorbance was measured at 517 nm using a UV–visible spectrophotometer. The $IC_{50}$ value of the extract was calculated.

### PANCREATIC LIPASE INHIBITION ASSAY

Pancreatic lipase activity was determined by measuring the hydrolysis of *p*-nitrophenyl butyrate (*p*-NPB) to *p*-nitrophenol using a method reported previously.[26] The 0.1 mg/ml of enzyme solution was prepared by reconstituting porcine pancreatic lipase using 0.1 M Tris-HCl buffer (pH 8). Then, 5 µl of test sample was mixed with 90 µl of enzyme buffer, and incubated for 15 min at 37°C. After incubation, 5 µl of 10 mM *p*-nitro phenylbutyrate (*p*-NPB) was added to enzyme mixture and the reaction was allowed to proceed for further 15 min at 37°C. After incubation, the absorbance of p-nitrophenol released was measured at 405 nm using a UV Vis spectrophotometer.

## RESULTS

### SOLUBILITY ANALYSIS OF EXTRACT

Different solvents such as water, DMSO, Chloroform, ethanol, methanol, ethyl acetate and acetone were used to determine the solubility of the *S. commune* extract. The extract was found to be soluble in water, ethanol, DMSO and methanol. This analysis helped in selecting suitable solvents for conducting *in vitro* studies. Water was used as a vehicle for the *in vitro* assays.

### PHYTOCHEMICAL INVESTIGATION

A qualitative phytochemical analysis of the Methanolic extract of *S. commune* was carried out using standard tests to identify the presence of various phytoconstituents. The results are summarized in the Table 1.

**Table 1: Preliminary phytochemical analysis of *S. commune.***

| SL. NO | Phytochemical compounds | Methanolic extract |
|---|---|---|
| 1. | Carbohydrates | + |
| 2. | Amino acids | _ |
| 3. | Alkaloids | _ |
| 4. | Glycosides | + |
| 5. | Flavonoids | + |
| 6. | Phenols | + |
| 7. | Saponins | - |

**Note:** - indicates absence of phytochemicals.
+ indicates present of phytochemicals.

**ANTI OXIDANT ACTIVITY**

**DPPH radical scavenging assay**

The DPPH radical scavenging activity of *S. commune* extract is shown in Table 2 and Figure 1 The extract exhibited a dose-dependent scavenging effect. The $IC_{50}$ value of extract was 189.31 µg/ml against DPPH radicals.

**Table 2: Inhibitory effect of *S. commune* extract on DPPH free radicals.**

| SL. NO | Concentration(µg/ml) | % inhibition | IC50 value (µg/ml) |
|---|---|---|---|
| 1. | 50 | 9.2% | 189.31 µg/ml |
| 2. | 100 | 17.7% | |
| 3. | 150 | 33.6% | |
| 4. | 200 | 56.2% | |
| 5. | 250 | 70.2% | |

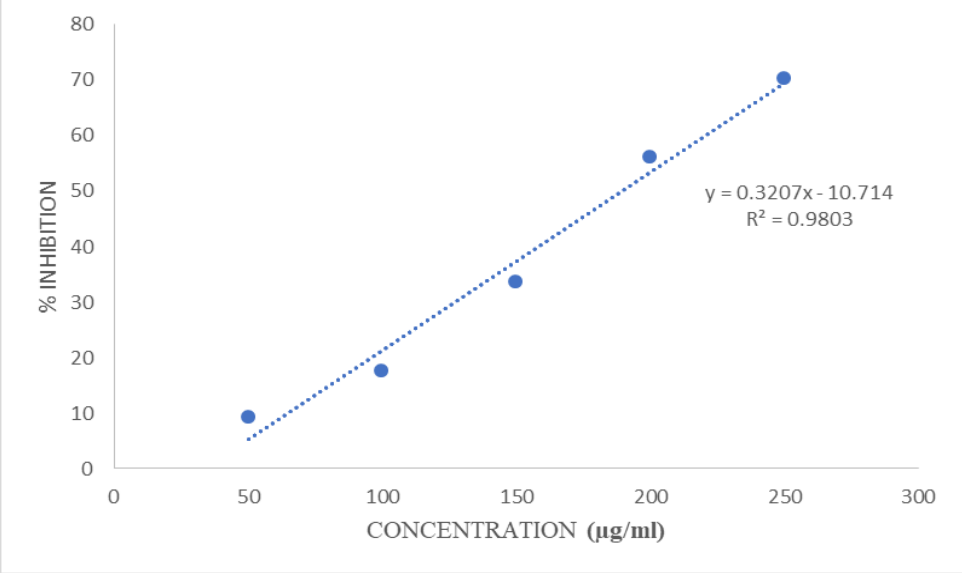



**Figure 1: Scatter graph of DPPH radical scavenging activity of S.Commune Extract.**

**PANCREATIC LIPASE ASSAY**

The methanolic extracts of *Schizophyllum Commune* was shows significant inhibition of pancreatic lipase enzyme. The $IC_{50}$ value of extract was 246.70 µg/ml against pancreatic lipase enzyme.

**Table 3: Pancreatic lipase inhibition activity of *Schizophyllum commune.***

| SI.No | Concentration (µg/ml) | % inhibition of Pancreatic lipase enzyme | IC50 value (µg/ml) |
|---|---|---|---|
| 1. | 50 | 17.4% | 246.70 µg/ml |
| 2. | 100 | 25.8% | |
| 3. | 150 | 35.0% | |
| 4. | 200 | 42.4% | |
| 5. | 250 | 50.1% | |

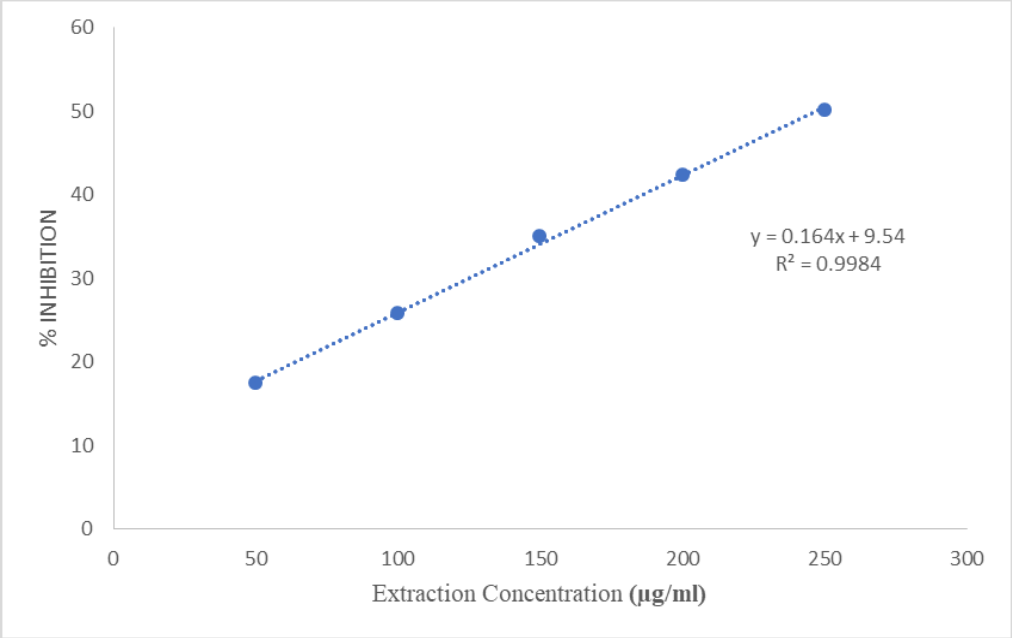



**Figure 2: Pancreatic lipase inhibition activity of *Schizophyllum commune.***

## DISCUSSION

The present study was carried out to evaluate the in-vitro hypolipidemic and antioxidant activities of the methanolic extract of *Schizophyllum commune*. Preliminary phytochemical screening of the extract revealed the presence of carbohydrates, glycosides, flavonoids and phenolic compounds, while amino acids, alkaloids and saponins were not detected. The presence of these phytoconstituents may contribute to the biological activities observed in the present study.

The antioxidant activity of the methanolic extract was evaluated by the DPPH radical scavenging assay. The extract showed a concentration-dependent increase in percentage inhibition, indicating an increase in free-radical scavenging activity with increasing concentration. The percentage inhibition increased from 9.2% at 50 µg/ml to 70.2% at 250 µg/ml. The $IC_{50}$ value was found to be 189.31 µg/ml. These findings indicate that the methanolic extract possesses free-radical scavenging potential, which may be associated with the phenolic and flavonoid constituents present in the extract.

The hypolipidemic potential of the extract was investigated using the pancreatic lipase inhibition assay. The extract demonstrated a concentration-dependent inhibition of pancreatic lipase enzyme. The percentage inhibition increased from 17.4% at 50 µg/ml to 50.1% at 250 µg/ml, with an $IC_{50}$ value of 246.70 µg/ml. The inhibition of pancreatic lipase suggests that the extract may reduce the enzymatic hydrolysis of dietary triglycerides and thereby may have potential in controlling lipid digestion and absorption.

Overall, the findings demonstrate that the methanolic extract of *Schizophyllum commune* possesses both antioxidant and pancreatic lipase inhibitory activities. The observed effects may be related to the combined action of the phytoconstituents present in the extract.

## CONCLUSION

The present study demonstrated that the methanolic extract of *Schizophyllum commune* possesses promising in-vitro antioxidant and hypolipidemic potential. The extract showed concentration-dependent DPPH radical scavenging activity with an $IC_{50}$ value of 189.31 µg/ml. It also exhibited concentration-dependent pancreatic lipase inhibition with an $IC_{50}$ value of 246.70 µg/ml. Preliminary phytochemical screening revealed the presence of carbohydrates, glycosides, flavonoids and phenolic compounds, which may contribute to the observed biological activities.

Thus, *Schizophyllum commune* may serve as a potential natural source of bioactive compounds with antioxidant and lipid-metabolism-related properties. Further studies involving isolation and characterization of active constituents, mechanistic investigations and in-vivo evaluation are required to establish its therapeutic potential.

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## CONFLICTS OF INTEREST

The author declares no conflicts of interest.

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