



Evaluation of *Hericium Erinaceus* (Lion's Mane Mushrooms) as Memory Enhancers in Wistar Rats

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ABSTRACT

This study investigates the memory-enhancing effects of *Hericium erinaceus*, commonly known as Lion's Mane mushroom, in Wistar rats. The mushroom extract, prepared using various solvents, was evaluated for phytochemical composition, acute toxicity, and effects on spatial memory and anxiety-related behaviors. The ethanolic extract demonstrated a higher yield, rich in flavonoids and micronutrients. Behavioral assessments using the T-maze and Morris water maze revealed improved learning, memory, and reduced anxiety in treated groups. These findings suggest that *Hericium erinaceus* possesses neurocognitive enhancement properties, potentially useful for future therapeutic applications in memory-related disorders.

Introduction

Hericium erinaceus (Lion's Mane mushroom) has garnered attention for its neuroprotective and cognitive-enhancing properties. Studies highlight its potential in stimulating nerve growth factors and improving memory in cognitive disorders. The current research focuses on evaluating its memory-enhancing effects using various doses on Wistar rats, examining neurocognitive improvements via T-maze and Morris water maze tests. This research also includes a detailed extraction process, acute toxicity studies, and an exploration of bioactive phytochemicals within *H. erinaceus*.

Materials and Methods

Preparation of Extraction of *Hericium erinaceus*: Lion's Mane mushroom was dried, coarsely powdered, and subjected to continuous hot percolation using petroleum ether, chloroform, ethanol, and cold maceration with distilled water. The ethanolic extract yielded the highest concentration of bioactive compounds, confirmed by phytochemical screening.

Phytochemical Screening: Phytochemical analyses were conducted for alkaloids, flavonoids, saponins, and other compounds using standard methodologies. The presence of flavonoids was particularly noted in the ethanolic extract.

Acute Toxicity Studies: Acute toxicity was assessed per OECD guidelines, with doses ranging from 5 mg/kg to 2000 mg/kg in Swiss albino mice, revealing no toxicity or mortality at the highest dose.

Experimental Animals and Design: Male Wistar rats (150-200 g) were grouped for control, standard, low-dose, and high-dose treatments. Rats in treatment groups received ethanolic extracts of *H. erinaceus* (100 mg/kg and 200 mg/kg, respectively) for seven days. A control group received saline, and a standard group was administered Donepezil (1 mg/kg).

Behavioral Tests:

1. T-Maze Test:

- **Percent Time in Open Arm:** Assesses anxiety-related behavior.
- **Number of Transitions:** Indicates exploratory behavior.
- **Latency to Enter Center:** Reflects decision-making speed.

2. Morris Water Maze Test:

- **Path Length and Latency to Platform:** Assess spatial learning and memory.
- **Acceleration and Head Dips:** Indicate spatial awareness and reduced anxiety.

Results

The findings highlighted a significant increase in exploratory behavior, spatial memory, and decreased anxiety in *H. erinaceus*-treated groups.

1. **Phytochemical Composition:**

- Flavonoids, phenols, saponins, and alkaloids were identified, suggesting neuroprotective potential.

2. **Percentage Yield of Extract:**

- Ethanolic extraction yielded the highest concentration.

3. **Acute Toxicity:**

- All doses up to 2000 mg/kg were non-toxic.

4. **Body Weight Assessment:**

- Treated rats displayed gradual weight gain.

5. **Behavioral Parameters:**

- **T-Maze Test:** Increased time in open arms and reduced latency in treated rats indicate reduced anxiety and enhanced exploration.
- **Morris Water Maze Test:** Reduced latency and path length in treated groups demonstrate improved memory retention.

Discussion

The presence of flavonoids and other neuroprotective phytochemicals in *H. erinaceus* suggests its potential as a memory enhancer. The T-maze and Morris water maze results highlight improved cognitive function and reduced anxiety in rats, attributed to neurogenic stimulation by active compounds in the mushroom extract. The increased body weight in treated groups implies good tolerability, while the absence of toxicity at high doses supports its safety for prolonged use.

Conclusion

The study concludes that *Hericium erinaceus* exhibits promising effects as a memory enhancer in Wistar rats, particularly through its ethanolic extract. These findings support further exploration into the mushroom's therapeutic applications for cognitive disorders.

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