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Mini Review Article

Analysis of Bioactive Compounds in Indigenous Mushrooms for Neurodegenerative Treatments

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ABSTRACT

Neurodegenerative disorders, such as Alzheimer's disease (AD), Parkinson's disease (PD), and Huntington's disease (HD), pose a major global health challenge. Growing research efforts have been directed toward bioactive compounds sourced from nature, particularly mushrooms, due to their neuroprotective effects. Indigenous mushrooms are rich in bioactive molecules, including polysaccharides, terpenoids, phenolic compounds, and alkaloids, which demonstrate antioxidant, anti-inflammatory, and neurodegenerative properties. This review examines the potential of indigenous mushrooms in treating neurodegenerative diseases, emphasizing their bioactive components, mechanisms of action, and therapeutic benefits.

INTRODUCTION

Neurodegenerative diseases (NDs) affect millions of people worldwide and are characterized by progressive neuronal loss, oxidative stress, and inflammation[1]. Current treatments primarily focus on symptom management rather than disease modification, necessitating the search for novel therapeutic agents. Mushrooms, particularly indigenous species, have emerged as a rich source of bioactive compounds with neuroprotective potential[5].Indigenous mushrooms, traditionally used in folk medicine, contain a variety of secondary metabolites that influence neurodegeneration. Compounds such as erinacines, hericenones, and β-glucans have been shown to promote neurogenesis, reduce oxidative damage, and modulate inflammatory pathways [8].

2. Bioactive Compounds in Indigenous Mushrooms

2.1. Polysaccharides

Mushroom-derived polysaccharides, especially β-glucans, are known for their immunomodulatory and neuroprotective effects. Ganoderma lucidum, commonly used in traditional medicine, contains polysaccharides that reduce neuroinflammation

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and enhance cognitive function in animal models of Alzheimer's disease[6].

2.2. Terpenoids

Terpenoids, including triterpenes from Ganoderma and erinacines from Hericium erinaceus, have demonstrated neuroprotective effects. Erinacines promote nerve growth factor (NGF) synthesis, enhancing neuronal survival and regeneration[4]. Studies indicate that erinacines A and S from H. erinaceus improve cognitive function and reduce amyloid-β plaque accumulation in AD models [1].

2.3. Phenolic Compounds and Flavonoids

Phenolic compounds, including flavonoids, act as antioxidants and protect neurons from oxidative stress-induced damage. Pleurotus ostreatus extracts contain high levels of flavonoids, which have been shown to enhance synaptic plasticity and reduce neuroinflammation in Parkinson's models [7].

2.4. Alkaloids

Alkaloids from mushrooms such as Cordyceps sinensis exhibit neuroprotective effects by modulating neurotransmitter levels and reducing oxidative stress. Cordycepin, a bioactive compound in C. sinensis, has been found to inhibit neuroinflammation and prevent neuronal apoptosis in PD models [3].

3. Mechanisms of Neuroprotection

Mushroom-derived bioactive compounds exert their neuroprotective effects through various mechanisms:

Reduction of Oxidative Stress: Many indigenous mushrooms possess potent antioxidant activity, which protects neurons from oxidative damage[8].Anti-Inflammatory Action: Polysaccharides and flavonoids inhibit pro-inflammatory cytokines, reducing neuroinflammation[6].Neurogenesis and Neuroprotection: Erinacines and hericenones stimulate NGF production, promoting neuronal survival and repair[4].Modulation of Neurotransmitters: Alkaloids from mushrooms like C. sinensis help regulate dopamine and acetylcholine levels, crucial in PD and AD treatment[3].

4. CONCLUSION

Indigenous mushrooms offer a promising source of bioactive compounds for neurodegenerative disease treatment. Polysaccharides, terpenoids, phenolic compounds, and alkaloids present in mushrooms have demonstrated significant neuroprotective properties. However, further research is required to standardize extraction methods, improve bioavailability, and validate clinical efficacy.

REFRENCES

1. Chen, Y., Zhang, L., & Wang, Y. (2020). Natural bioactive compounds from fungi in neurodegenerative disease treatment. Journal of Natural Medicine, 74(3), 561-576.
2. Lee, J., Kim, S., & Park, H. (2021). The role of Hericium erinaceus in Alzheimer's disease prevention: A molecular perspective. Frontiers in Aging Neuroscience, 13, 145-159.
3. Liu, X., Yang, Z., & Wang, P. (2022). Cordycepin as a potential therapeutic agent in neurodegenerative diseases. Neuropharmacology, 183, 108-115.
4. Mori, K., Obara, Y., & Matsunaga, Y. (2019). Erinacine-mediated neuroprotection: Insights from Hericium erinaceus research. Phytotherapy Research, 33(6), 1572-1585. https://doi.org/10.1002/ptr.6392
5. Phan, C. W., David, P., & Sabaratnam, V. (2021). Therapeutic potential of mushrooms in

neurodegenerative diseases: A review. International Journal of Molecular Sciences, 22(12), 6565-6582.

6. Wang, H., Chen, L., & Zhang, Y. (2021). Polysaccharides from Ganoderma lucidum and their neuroprotective potential. Biomedicine & Pharmacotherapy, 133, 110992.
7. Zhao, C., Qiu, H., & Xu, L. (2020). Pleurotus ostreatus-derived flavonoids as neuroprotective agents in Parkinson's disease. Neuroscience Letters, 714, 134628.
8. Zhang, T., Li, X., & Zhao, Z. (2022). Antioxidant and anti-inflammatory effects of mushroom bioactives in neurodegeneration. Molecules, 27(9), 2751-2768.

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