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Original Article

Assessment of Anti-Alzheimer Characterization of Green Synthesized Zinc Nanoparticles Containing Extract of *Cordyceps militaris*

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ABSTRACT

Background: In current research, Zinc Nanoparticles (ZnNPs) were synthesized using green synthesis technology. It is the best method which is eco-friendly and cost-effective. The extract of fungus *Cordyceps militaris* was used for this purpose, which was followed by muffle furnace assisted synthesis of zinc nanoparticles. **Objectives:** The main objective of this research work was to assess the anticholinesterase and antioxidant activity mediated Anti-Alzheimer activity of *Cordyceps militaris* and zinc nanoparticles prepared by green synthesis process. **Materials and Methods:** The zinc nanoparticles were prepared by green synthesis process using extract of fungus *Cordyceps militaris*. Characterization of prepared nanoparticles were done by the Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), X-ray diffraction (XRD), EDX and Fourier Transform Infrared (FT-IR) spectroscopy for shape and size, Surface Plasmon Resonance (SPR), functional groups, crystallinity. It was observed that SPR peak were formed 375 nm, which was determined through UV-visible Spectroscopy. **Results:** SEM and TEM photomicrograph shown particles were formed spherical in the shape with smooth surface having 37.09 nm average particle sizes. SPR for nanoparticles was found at 300 nm. X-ray diffraction analysis confirm crystalline shaped of prepared nanoparticles. Moreover, during the synthesis of nanoparticles, the colour of suspension changed from dark yellow to colourless with development of cloudiness in solution. The different functional groups involved in nanoparticle stabilization were determined using FTIR Spectroscopy. **Conclusion:** Furthermore, the Alzheimer activity of plant extracts and ZnNPs have been carried out using the Ellman technique through cholinesterase with small modification. The IC_{50} value in anticholinesterase inhibitory activity of zinc nanoparticles was found 83.16237 μg/mL while IC_{50} value of donepezil was found 51.38714 μg/mL which was taken as standard. It was concluded that the result indicated the promising inhibitory potential of cholinesterase activity. The antioxidant assay results with percentage inhibition 127.0308 μg/mL showed the most effective antioxidant property source than aqueous extract of *Cordyceps militaris*.

Keywords: Zinc nanoparticles, *Cordyceps militaris*, Anti-cholinesterase, Alzheimer anti-Alzheimer, Green synthesis.

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INTRODUCTION

Alzheimer is a neurodegenerative disease that begins slowly and gets worse over time and it primarily affects old age people. The incidence of this disease in patients has increased in recent years, according to the World Health Organizations from year 2019, across 50 million population are suffering from the dementia, which have increased upto (10 million) a year. It must be approximated that the number of cases having dementia has raise up to 52-82 in 2030-2050, with people with AD reporting for 60-70% of all citizens. Drugs with Acetyl cholinesterase inhibitory (AchE) effects have shown good results in improving memory problem in Alzheimer's disease patients.[1] As a result, research is focusing on discovering AChE inhibitors as new treatments for Alzheimer's disease. Humans have oxidated stress which shows connections with inflammatory process and further results in causing hypertension, cancer and neurodisorder disease. Reactive Oxygen species known as ROS causes degradation of many bioactive molecules like DNA, proteins and lipids, resulting

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