

## ABSTRACT

Nanotechnology is a prolonged branch of existing research that involves the fabrication and customization of particle structures with typical sizes of less than 100 nm. A large area of surface-to-volume ratio was related to minimum surface functionalization, resulting in nanostructured metal oxide nanoparticles with outstanding biological activity. The biosynthesis of nanoparticles has become an important research area because of their remarkable environmental friendliness and biocompatibility. Catechin, a group of polyphenolic compounds is widely used as nutraceuticals, Zinc oxide in the form of nanoparticles, can enhance beneficial therapeutic effects to the development of nanotechnology shown to have neurogenic and neuroprotective effects, regeneration and repair of damaged brain tissue, cortical neurons synaptic connection and synaptic plasticity and ultimately promote regeneration. *Camellia sinensis* is one of the most popular plants used in green tea production worldwide, which possesses the antioxidant and neuroprotective properties. The aim of this research is the synthesized zinc oxide nanoparticle-capped catechin and investigation of their neuroprotective potential. Zinc oxide nanoparticles synthesized from the *Camellia sinensis* leaf extract by nano precipitation method, then capped with catechin. The nanoparticles were characterized by different techniques, such as UV Vis spectrophotometer, Scanning electron microscopy, Zeta potential, Fourier transform infrared spectroscopy and X-ray diffraction analysis. Synthesized zinc oxide nanoparticle-capped catechin exhibited the antioxidant activity was determined using the DPPH radical scavenging activity. Synthesized zinc oxide nanoparticle-capped catechin has significantly inhibited the acetylcholinesterase activity. A dose-dependent cell viability of synthesized zinc oxide nanoparticle-capped catechin has been observed against Neuro 2a cells. .

**Key words:** Zinc oxide nanoparticles, catechin, *Camellia sinensis*, neuro 2a cells, neuroprotective, antioxidant, acetylcholinesterase