Summary
Centella asiatica, a natural antioxidant has been shown to possess neuromodulating property as cited in Susruta Samhita and has wide medicinal uses as mentioned in Ayurveda since prehistoric times (Sanjay, 2000). The present study was undertaken to explore the beneficial role of Centella asiatica (300 mg/kg body weight/day for 60 days) in alleviating some of the age-associated biochemical changes in discrete brain regions using rats as the experimental model.

The free radical scavenging property and total phenol content in Centella asiatica were estimated in different extracts. The assays suggested that aqueous ethanolic extract of Centella asiatica contained constituents that have high phenolic content with DPPH radical scavenging activity than the water and ethanolic extracts. Centella asiatica possesses potent antioxidant property, as evidenced by the prevention of protein damage by hypochlorous acid.

Antioxidant enzymes - SOD, CAT and GSH-Px and low molecular weight antioxidant compounds - vitamin E, vitamin C and GSH were significantly decreased in aged rat brain regions. Administration of Centella asiatica to aged rats increased the status of antioxidants.

ROS generation was found to be increased in discrete brain regions of aged rats. Centella asiatica effectively scavenged the free radical generation in aged rat brain regions.
The activities of Na\(^+\)K\(^+\)ATPase, Ca\(^2+\)ATPase and Mg\(^2+\)ATPase were found to be lowered during aging whereas the activities of these enzymes were found to be ameliorated on *Centella asiatica* treatment. *Centella asiatica* also improved performance on memory tasks.

Oxidative damage to lipids, proteins and DNA were measured in terms of LPO, PCO, 8-OHdG, comet assay and DNA protein cross links. It was observed that the age associated increase in these indices was prevented by *Centella asiatica*.

The mRNA levels of NGF and BDNF in hippocampus of aged rat brain were also found to be decreased, which was restored on administration of *Centella asiatica*.

The age associated decrease in the levels of dopamine, norepinephrine, serotonin, 5-hydroxy indole acetic acid, acetylcholine esterase, and inhibitory amino acids was observed in aged rat brain regions. On the other hand, glutamate and aspartate were found to be increased in aged rat brain regions. *Centella asiatica* therapy reversed these alterations to that of near normalcy in different brain regions.

The extent of apoptosis was found to be high in brain of aged rats as evidenced by observed increase in intracellular calcium, release of cytochrome c, activation of caspase-3, DNA fragmentation and decreased level of Bcl-2. Administration of *Centella asiatica* to aged rats reduced the incidence of apoptosis indicating the cytoprotective role of *Centella asiatica* in aged rats.