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## Protective effect of lavender oil on scopolamine induced cognitive

### deficits in mice and H<sub>2</sub>O<sub>2</sub> induced cytotoxicity in PC12 cells

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#### Abstract

##### Ethnopharmacological relevance

Lavender essential oil (LO), an aromatic liquid extracted from *Lavandula angustifolia* Mill., has been traditionally used in the treatments of many nervous system diseases, and recently LO also reported to be effective for the Alzheimer's disease (AD).

##### Aim of the study

The improvement effect of lavender oil (LO) on the scopolamine-induced cognitive deficits in mice and H<sub>2</sub>O<sub>2</sub> induced cytotoxicity in PC12 cells have been evaluated. The relevant mechanism was also researched from the perspective of antioxidant effect and cholinergic system modulation.

##### Materials and Methods

Cognitive deficits were induced in C57BL/6J mice treated with scopolamine (1 mg/kg, i.p.) and were assessed by Morris water maze (MWM) and step-through passive avoidance tests. Then their hippocampus were removed for biochemical assays (acetylcholinesterase (AChE), superoxide dismutase (SOD), glutathione peroxidase (GPX) and malondialdehyde (MDA)). In vitro, the cytotoxicity were induced by 4 h exposure to H<sub>2</sub>O<sub>2</sub> in PC12 and evaluated by cell viability (MTT), lactate dehydrogenase (LDH) level, nitric oxide (NO) release, reactive oxygen species (ROS) production and mitochondrial membrane potential (MMP).

##### Results

The results demonstrated that LO (100 mg/kg) could improve the cognitive performance of scopolamine induced mice in behavioral tests. Meanwhile, it significantly decreased the AChE activity, MDA level, and increase SOD and GPX activities of the model. Moreover, LO (12 µg/mL) protected PC12 cells from H<sub>2</sub>O<sub>2</sub> induced cytotoxicity by reducing LDH, NO release, intracellular ROS accumulation and MMP loss.

##### Conclusions

It was suggested that LO could show neuroprotective effect in AD model in vivo (scopolamine-treated mice) and in vitro (H<sub>2</sub>O<sub>2</sub> induced PC12 cells) via modulating oxidative stress and AChE activity.

Keywords: Lavender oil; Scopolamine; PC12 cells; Morris water maze test; Oxidative

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