



### ***In vitro* cholinesterase inhibitory activity of *Areca catechu* L.**

M. Saeedi<sup>1,2</sup>, T. Akbarzadeh<sup>2,3</sup>, M. Khanavi<sup>2,4</sup>, M. Vazirian<sup>4</sup>, M.R. Shams Ardekani<sup>2,4</sup>, K. Babaie<sup>4\*</sup>

<sup>1</sup>Medicinal Plants Research Center, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.

<sup>2</sup>Persian Medicine and Pharmacy Research Center, Tehran University of Medical Sciences, Tehran, Iran.

<sup>3</sup>Department of Medicinal Chemistry, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.

<sup>4</sup>Department of Pharmacognosy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.

**Background and objectives:** Alzheimer's disease (AD) is characterized as the most prevalent age related neurodegenerative disease along with cognitive impairment in elderly people. Most of therapeutic treatments for AD have dedicated to the inhibition of cholinesterase (ChEs) to increase the level of acetylcholine (ACh) in the cholinergic synaptic cleft. Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) are two enzymes which hydrolyze choline-based esters leading to the improvement of symptom in patients with AD. In this study, focusing on the efficacy and versatile biological activities of medicinal plants, we investigated the anti-ChE activity of *Areca catechu* L. used in Iranian traditional medicine for the improvement of AD symptoms. **Methods:** Anticholinesterase activity of aqueous and hydroalcoholic extracts of the plant was evaluated according to Ellman's method and compared with rivastigmine as the reference drug. Also, kinetic study was performed based on the same method. **Results:** The best anti-AChE activity was obtained by aqueous extract of *A. catechu* with  $IC_{50} 32.00 \pm 0.84 \mu\text{g/mL}$ . However, the hydroalcoholic extract showed anti-AChE activity with  $IC_{50} 389.89 \pm 0.16 \mu\text{g/mL}$ . It should be noted that the aqueous extract of *A. catechu* depicted good activity against BChE with  $IC_{50} 48.81 \pm 0.12 \mu\text{g/mL}$  whereas the hydroalcoholic extract showed no activity. Also, kinetic study of aqueous extract of *A. catechu* for AChE confirmed a mixed type of inhibition. **Conclusion:** Our results showed that *A. catechu* possessed satisfactory anti-ChE activity and could be considered for further anti-AD studies to obtain a herbal supplement.

**Keywords:** Alzheimer's disease, *Areca catechu* L., cholinesterase enzyme, medicinal plants