

## In-vitro screening of acetylcholinesterase inhibitory activity of extracts from Palestinian indigenous flora in relation to the treatment of Alzheimer's disease

Mohammed Saleem Ali-Shtayeh<sup>1</sup> Rana Majed Jamous<sup>1</sup>, Salam Yousef Abu Zaitoun<sup>1</sup>, and Iman Basem Qasem<sup>1</sup>

<sup>1</sup>Biodiversity and Biotechnology Research Unit, Biodiversity and Environmental Research Center-BERC, P.O. Box 696, Til, Nablus, Palestine

**Correspondence Author:** Prof. Mohammed S Ali-Shtayeh, Biodiversity and Biotechnology Research Unit, Biodiversity and Environmental Research Center-BERC, P.O. Box 696, Til, Nablus, Palestine

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### ABSTRACT:

**Background:** Cholinesterase inhibitory therapy serves as a strategy for the treatment of Alzheimer's disease (AD). Several acetylcholinesterase inhibitors (AChEIs) are used for the symptomatic treatment of AD. These compounds have been reported to have adverse effects, including gastrointestinal disturbances.

This study was therefore partly aimed at investigating *in vitro* possible AChEIs in herbal medicines traditionally used in Palestine to treat cognitive disorders, and to point out the role of these plants as potential sources for development of newly potent and safe natural therapeutic agents of AD. Assay of AChE activity plays an important role *in vitro* characterization of drugs including potential treatments for AD. The most widely used method, is based on Ellman's method. The reactant used in this method shows chemical reactivity with oxime antidotes and thiol leading to false positive reactions. A new alternative assay could be of high interest.

**Methods:** The effect on AChE activity of 92 extracts of 47 medicinal plants were evaluated using a new micro-well plate AChE activity (NA-FB) and Ellman's assays. In addition, antioxidant activity using DPPH was determined.

**Results:** The main advantages of the new method (NA-FB) is that the colorimetric change is better observable visually allowing spectrophotometric as well as colorimetric assay, and does not show any chemical reactivity with thiol. 67.4% and 37% of extracts inhibited AChE by  $\geq 50\%$  using the NA-FB and Ellman's assays, respectively. Using NA-FB assay, 84 extracts interacted reversibly with the enzyme, of which *Mentha spicata* (94.8%), *Foeniculum vulgare*

(89.81), and *Oxalis pes-caprae* (89.21) were most potent, and 8 showed irreversible inhibition of which leaves of *Lupinus pilosus* (92.02%) were most active. Antioxidant activity was demonstrated by 73 extracts *Majorana syriaca* (IC<sub>50</sub> 0.21mg/ml), and *Rosmarinus officinalis* (0.38) were the most active.

**Conclusions:** NA-FB assay has shown to be simple, accurate, sensitive, spectrophotometric and colorimetric, and superior to Ellman's, and therefore can be used efficiently for qualitative and quantitative studies of AChEI activities of extracts. Palestinian flora have shown to be a rich source for, new and promising agents (AChEIs) for the treatment of AD Further studies are needed to isolate and identify the active compounds responsible for AChEI activities.

**Keywords:** Alzheimer's disease, ACh, medicinal plants,  $\beta$ -naphthyl acetate, micro-well plate AChE activity Assay (NA-FB)