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## Potential molecular mechanism of *Berberise vulgaris* extract, berberine and berberine chitosan nanoparticles in Alzheimer treatment

Major characteristics of Alzheimer's disease (AD) are synaptic loss, cholinergic dysfunction, and abnormal protein depositions in the brain in form of toxic non-soluble amyloids and hyperphosphorylated tau. Our main focus in the present study is to assess the therapeutic effect of berberise vulgaris extract, berberine and berberine nanoparticle against AD-like disease by tracking its effect on the oxidative stress- inflammatory pathway and MAPK pathway as well as AD hall markers. AD induced in rats by oral administration of 5 ml of contaminant water for 3 months or insulin resistance for one month. Then the treatment with tested compounds was carried out for another one month. Firstly, we examined the berberine effect in *silico* and we found that berberine was potent anti-acetylcholine and inhibited both TNF-alpha-converting enzyme and COX-2. Our biochemical and molecular parameters showed that tested compounds inhibited the AChE and down-regulated it's expression that could be returned its ability to act as potent antioxidants in brain tissue. Matching with -in *silico* study, berberine normalized the production of TNF- alpha, IL12, IL 6 and IL 1β, ADAM 10 and ADAM 17. Finally, Berberine activated the production of APP-40 that acts as antioxidants for brain tissue and inhibited the production of APP-42 fragment that responsible for beta-amyloid plaques formation. Altogether, our data confirmed the use of berberine as well as berberine nanoparticles, as drug candidate for AD like disease treatment as berberine can lower amyloid beta via multiple mechanisms.

### Biography

Doaa A Ghareeb is Associate Professor of Biochemistry, Faculty of Science, Alexandria University. She has published more than 25 papers in reputed journals and is serving as an Editorial Board Member of repute. She is a Reviewer in Alzheimer Association, Director of biological screening and preclinical trail lab in her department and also is the Manager of project and Scientific Creation office in her faculty. She has two patents considered, on HCV and lung cancer treatment. She is a supervisor for several MSc and PhD students and also supervises several international students from Africa and Asia. Her research interests are in immune-therapy and natural products.

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