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Levetiracetam and cognition in sporadic dementia of Alzheimer's type in rats

Cherine Adel Ismail

Alexandria University, Egypt

Sporadic dementia of Alzheimer's type is a progressive neurodegenerative disorder. While, Alzheimer's disease (AD) patients have an increased risk of developing seizures, epileptic activity triggers a variety of inhibitory compensatory responses in hippocampal circuits to counteract imbalances in network activity, interfering with normal neuronal/synaptic functions required for learning and memory. Since, antiepileptic drugs (AEDs) have been claimed to variably modulate cognition, a concern is raised about the most favorable AEDs member in such indication. The study compared the impact of relatively newer AEDs (gabapentin/levetiracetam) versus an old one (carbamazepine) on cognitive impairment-induced by intracerebroventricular (icv) colchicine injection in rats. Fifty-six male Wistar rats were equally assigned into control (normal, aCSF-injected, and vehicle-treated AD) and treated groups. Following icv colchicine injection (15µg/5µl/bilaterally), rats (8-rat/group) randomly received gabapentin (60mg/kg/day), levetiracetam (100mg/kg/day), carbamazepine (100mg/kg/day), donepezil (2mg/kg/day), or vehicle orally once daily for 26 days. Behavioral assessment was done using Morris water maze (days 13, 14 and 21 post-surgery), and passive avoidance (days 25/26) tasks. Biochemically, oxidative stress (malondialdehyde and reduced-glutathione), cholinergic deficit (acetylcholinesterase (AChE) activity), and neurotrophic (Brain-derived neurotrophic factor (BDNF)) parameters were measured in hippocampus and prefrontal cortex. Gabapentin, and levetiracetam significantly improved colchicine-induced cognitive impairment, oxidative stress, and reduced BDNF level. Gabapentin increased AChE activity, while levetiracetam decreased it, in both tissues. Despite the increase in BDNF, carbamazepine didn't significantly improve colchicine-induced cognitive impairment, oxidative stress, or cholinergic deficit. New AEDs, particularly levetiracetam, improved cognitive function and obviously protected both hippocampus and prefrontal cortex from colchicine deleterious effects. Based on its significant neuroprotection, levetiracetam might be the most favorable AEDs to be used in Alzheimer's-like dementia.

Biography

Cherine A Ismail has completed her PhD at the age of 26 years from Alexandria University and postdoctoral studies from Alexandria University School of Medicine. She is a lecturer in Clinical Pharmacology Department, Alexandria University School of Medicine. She has published 8 papers in reputed journals.

cherine.ismail@alexmed.edu.eg

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