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Poster Presentation

Agmatine Protects Against Intracerebroventricular Streptozotocin-Induced Water Maze Memory Deficit, Hippocampal ApoptosisandAkt/GSK3β Signaling Disruption

Maryam Moosavi[1], Amir Hossein Zarifkar[1, 2*], Yaghoub Farbood[2], Mahin Dianat[2], Alireza Sarkaki[2], Rasoul Ghasemi[3]

[1]Department of Physiology, Shiraz University of Medical Sciences, Shiraz, Iran

[2]Department of Physiology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences (AJUMS), Ahvaz, Iran

[3]Department of Physiology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

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Abstract

Intracerebroventricular stereptozotocin (STZ) treatment has been described as a suitable model for sporadic Alzheimer's disease (sAD). Centrally administered STZ decreases insulin and insulin receptors in the brain and interrupts PI3/Akt signaling pathway and GSK-3β. Additionally it raises Bax/Bcl-2 ratio and prompts hippocampal apoptosis. Agmatine, a polyamine derived from L-arginine decarboxylation, is recently shown to exert some neuroprotective effects. This study aimed to assess if agmatine reverses STZ-induced memory deficits and Akt/GSK-3β signaling disruption and apoptosis in the hippocampus. Adult male Sprague-Dawely rats weighing 200-250 g were used in this study. The canules were implanted bilaterally into lateral ventricle. STZ was administered on days 1 and 3 (3 mg/kg). Agmatine treatment (40 or 80 mg/kg) was started from day 4 in an every other day manner and continued till day 14. The animal's learning and memory capability was assessed on days 15-18 using Morris water maze. After complement of the behavioral studies the hippocampi was isolated and the amounts of hippocampal cleaved caspase 3 (the landmark of apoptosis), Bax/Bcl-2 ratio, total and phosphorylated forms of GSK-3β and p-Akt were analyzed by western blot. The results showed that agmatine in 80 but not 40 mg/kg reversed the memory loss induced by STZ. Western blot analysis revealed that STZ induced elevation of caspase-3; Bax/Bcl-2 ratio and disrupted Akt/GSK-3β signaling in the hippocampus. Agmatine prevented apoptosis and Akt/GSK-3β signaling alteration induced by STZ. This study disclosed that agmatine treatment avert not only STZ-induced memory deterioration but also hippocampal apoptosis and Akt/GSK-3β signaling interruption.

Keywords: STZ, Agmatine, Learning and Memory, Apoptosis, Akt, GSK-3β

****Corresponding Author:*** Amir Hossein Zarifkar

E-mail: *amirhosseinzarifkar13@yahoo.com*

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