



Chlorogenic Acid Improves Memory Function, Reduces Oxidative Stress and Apoptosis in the Hippocampus of Diabetic Rat Model

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ABSTRACT (upto 300 words)

Background: Diabetes mellitus (DM) is characterized by prolonged oxidative stress which leads to hippocampal neuronal apoptosis and memory dysfunction. Chlorogenic acid (CGA) has been known to have antioxidant and neuroprotective effects, but its role in hippocampus pathology of the diabetic condition remains unknown. We aimed to elucidate the role of CGA in attenuating memory dysfunction and its possible mechanisms in type-1 DM rats.

Methods: Male Wistar rats were treated by a single injection of streptozotocin 60 mg/kg intraperitoneally for 1,5 months (DM1,5) and 2 months (DM2). CGA was given intraperitoneally from 1.5 to 2 months with 12,5 mg/kg (CGA1), 25 mg/kg (CGA2), and 50 mg/kg (CGA3). Control group was also added. Morris water maze (MWM) was used to determine memory dysfunction before termination. Blood was collected, hippocampus was harvested then used for RNA and histopathological analysis. RT-PCR was performed for quantifying SOD1, SOD2, p53, Bax, and BCL-2 mRNA expression. Immunostaining was done for observing p53 expression.

Results: DM1,5 and DM2 groups showed longer in length and time of acquisition test based on MWM analysis, which associated with higher p53, Bax, and lower SOD2 and BCL-2 mRNA expression compared to Control group.

CGA1 group demonstrated improvement of memory function, lower p53, Bax and higher SOD2 mRNA expression compared to DM2 group. Immunostaining of p53 revealed apoptosis in CA3 area of hippocampus in DM groups while reducing the signal in CGA-treated groups.

Conclusion: CGA ameliorates memory dysfunction in association with reducing oxidative stress and apoptosis in the hippocampus of diabetic rats.

Keywords: diabetes mellitus, chlorogenic acid (CGA), hippocampus, memory dysfunction, oxidative stress, apoptosis.

BIOGRAPHY (upto 200 words)

Dwi Cahyani Ratna Sari is a professor at Department of Anatomy, Faculty of Medicine, Public Health, and Nursing. She focuses on Neuroanatomy and neuroscience, especially in learning and memory function. She establishes her laboratory with master and doctoral students and develop anatomy-functional and molecular analysis of many models in memory dysfunction relates to many conditions. She got many research grants from Indonesia government and some private sector.



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