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Department of Biology

The Thesis Submited for the Award of M.Sc. Degree in Genetics

Title

Molecular genetic analysis of rosmarinic acid neuroprotective potential against methamphetamine-induced neuronal damage in zebrafish

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Abstract

Methamphetamine (MA or METH), in the streets called to ice and crystal, is a drug of abuse. It has a deep impact on neurotransmission by disruption of releasing them into the Synaptic space and reuptaking them. So it is able to alter the way people think, feel and behave by disrupting neurotransmission, the process of communication between brain cells. METH changes some key biopathways cellularly and molecularly and most of them are involved in vital mechanism such as oxidative stress. METH and it's drivates such as dioxymethylene methamphetamine are powerful oxidants intially. In this paper we aimed to consider the possible therapeutic effects of a powerfull herbal antioxidant rosmarinic acid combined to bionanocomposite of ZnO/chitosan and used zebrafish as a model animal. The poisonous effects of METH and the possible therapeutic effects of the rosmarinic acid alone and the rosmarinic acid combined to bionanocomposite of ZnO/chitosan is demonstrated by measuring the changes in expression of *Casp3a* gene by Real-time PCR and *gapdh* as control gene and diving pattern by novel tank diving test compare to control group. We prepared 6 treatment groups, saline or control, methamphetamine and rosmarinic acid combined to ZnO/chitosan, methamphetamine alone, methamphetamine and rosmarinic acid, ZnO/chitosan and rosmarinic acid. At the end of the treatment period, we performed diving test for first three groups and Real-time PCR for all groups. Results demonstrated that rosmarinic acid combined to ZnO/chitosan has therapeutic effects on oxidative stress produced by methamphetamine.

Key words: Methamphetamine, Rosmarinic Acid, Oxidative Stress, Casp3a, Zebrafish