**BIOCHEMICAL AND MOLECULAR ASPECTS OF ALUMINIUM CHLORIDE-INDUCED NEUROTOXICITY IN MICE AND THE PROTECTIVE ROLE OF CROCUS SATIVUS L. EXTRACTION AND HONEY SYRUP**

Abstract—Aluminium has been proposed as an environmental factor that may affect several enzymes and other biomolecules related to neurotoxicity and Alzheimer’s disease (AD). The promising protective effect of aqueous saffron extract and honey syrup on neurotoxicity induced by aluminium chloride (AlCl₃) may be derived from their own antioxidant properties. Balb/c and C57BL/6 mice (35–40 g) were injected with AlCl₃, 40 mg/kg/day for 45 days. Each mice strain was divided into four groups: AlCl₃ treated group, AlCl₃ plus water saffron extract group (administered with saffron extract at 200 mg/kg b.w. once a day for the experimental period), AlCl₃ plus honey syrup group (administered with honey syrup at 500 mg/kg b.w. for 45 days). The control group received no treatment. Oxidative stress and antioxidant status were estimated in the brain and differential display was performed for both mice strains to scan the mRNA in the treated and non treated groups. In addition, the up and down regulated genes were isolated, cloned and sequenced. The sequence analysis was performed and compared with the other genes cited on GenBank. The results show that there was a decrease in the activity of the antioxidant enzymes (P dismutase (SOD), catalase (CAT), and glutathione peroxidase (GSH-Px)) in the AlCl₃ groups of both mice strains. The level of brain thiobarbituric acid reactive substances (TBARS) showed a significant increase (P peroxidation (LPO) in the AlCl₃ groups. There was an indication of carcinogenicity in the AlCl₃ treated group representing an increase in serum tumor markers such as arginase and a-l-fucosidase. More than 350 band patterns were obtained and about 22 different up-down regulated genes were observed. The sequence analysis of the three selected up-regulated genes revealed that they are similar to B-cell lymphoma 2 (Bcl-2), R-spondin and the inositol polyphosphate 4-phosphatase genes (INPP4B), respectively. The R-spondin gene was up-regulated in all examined animals except the control ones but the other two genes were only induced in the animals treated with AlCl₃ and honey syrup. We conclude that the biochemical and molecular studies showed the neurotoxicity of AlCl₃ in the brains of mice. In addition, there was an ameliorative change with saffron extract and honey syrup against AlCl₃ neurotoxicity. The obtained molecular results suggest that AlCl₃ made induction for BCL-W gene, which is
an anticancer gene or belongs to the DNA repair system in
the brain cells, as well as for R-spondin and inositol
polyphosphate 4-phosphatase genes, which help in cell
proliferation.

2- Effects of water extracts of thyme (Thymus vulgaris) and ginger (Zingiber officinale Roscoe) on alcohol abuse

Introduction: Alcohol abuse has many harmful effects on human body. This study aimed to investigate
the role of water extracts of thyme (Thymus vulgaris) and ginger (Zingiber officinale Roscoe) as natural
product extracts to detoxify the injuries of alcohol abuse on liver and brain of mice.

Materials and methods: Alcohol at a dose of 1.25 ml/50 ml water was orally administered
at the first day
of treatment with continuously increase of 1.25 ml per day to the end of experiment (14
days, 0.1 ml/45 g /
/d). Mice also were orally administered with alcohol and water extracts of thyme and
ginger in concentration
of 500 mg /kg body weight for 2 weeks.

Results: The results showed very highly significant increase in nitric oxide and
malondialdehyde level in
liver and brain and a very highly significant decrease in the total antioxidant capacity and
glutathione
peroxidase activity in alcoholic group. In addition, the liver function enzymes such as L-
c-glutamyl transpeptidase
and butyryl cholinesterase activities showed very highly significant increase in alcoholic
group.
In contrast, the water extracts of thyme and ginger showed significant amelioration on
these changes
both in liver and brain tissues.

Conclusion: The water extracts of thyme and ginger has detoxifying and antioxidant
effects. Therefore, it
is recommended to use them to avoid alcohol toxicity.