Protective effects of thymoquinone over the 2,3,7,8-Tetrachlorodibenzo-p-dioxin induced hepatotoxicity

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Statement of the Problem: 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is the most toxic member of halogenated aromatic hydrocarbons. TCDD is able to pass from environment to humans through the food chain by absorption of the gastrointestinal system. TCDD has many biological effects such as carcinogenesis, immune system suppression, neuronal damage, liver damage, developmental defects and fertility problems. TCDD leads to lipid peroxidation resulting in molecular oxygen transport increase which causes formation of reactive oxygen species within the tissue. Thymoquinone (TQ) which is one of the active ingredients in Nigella sativa plant was reported to have anti-carcinogen, antitumor, antibacterial, anti-inflammatory, antioxidant and immune system supporter effects.

Aim: The aim of this study is to investigate the protective effects of TQ in liver tissues of rats exposed to TCDD.

Methodology & Theoretical Orientation: Fifty rats were randomly divided to 5 groups (n=10 for each group) as follows: control, corn oil, TCDD (1µg/kg/day), TQ (50 mg/kg/day), TCDD+TQ (1µg/kg/day TCDD and 50 mg/kg/day TQ). Biochemical, histopathological and electron microscopic analyses were performed for liver tissues obtained after the experiment.

Findings: TCDD significantly increased MDA, TOS, ALT, AST and ALP levels and reduced GSH, TAS, SOD and CAT levels (p≤0.05) when compared to all other groups. In the TCDD+TQ group, MDA, TOS, ALT, AST, ALP levels approached to the control group levels and GSH, TAS, SOD, CAT levels increased and approached to the control group levels and were significantly different from TCDD group (p≤0.05). In terms of histopathological evaluation, total damage score (TDS) findings demonstrated that TCDD group showed an increase in TDS when compared to all other groups. In contrast, TCDD+TQ group showed a statistically significant decrease in TDS compared to TCDD group (p≤0.05). Transmission electron microscopic analysis showed that ultrastructural changes seen in TCDD group were diminished in TCDD+TQ group.

Recent Publications:


Biography

Semir Gul is a PhD student in the Department of Histology and Embryology, Faculty of Medicine, Inonu University, Turkey and obtained his Master's Degree from the same university. He graduated from Molecular Biology and Genetics Department in 2010 from Izmir Institute of Technology, Turkey. His research interests are: toxicology, reproductive biology and developmental biology.

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