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Effect of chrysin on oxidative stress, biochemical, and inflammatory alterations in Wistar albino rats exposed to cypermethrin

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Cypermethrin is a broad-spectrum pesticide commonly used in agricultural, veterinary and household applications. Cypermethrin, being a neurotoxic agent and due to its hydrophobic structure, may cause tissue and organ damage by stimulating oxidation in cells and increasing reactive oxygen species. It has a detrimental effect on the immune system and promote inflammation by producing cytokines. The harmful effects of cypermethrin may be alleviated by the intracellular defense system that reduces ROS. Chrysin, a flavonoid, commonly found in vegetables, propolis, honey, fruits and mushrooms, is known to possess antioxidant, antiviral, antidiabetic and anticarcinogenic properties. It provides protection against disease and toxicity through various mechanisms. In this study, we investigated the protective effects of chrysin against oxidative damage in rats exposed to cypermethrin. There is no research on the response of chrysin to the toxicity of cypermethrin in mammals and whether it can be used among treatment options or as a supplement to treatment. A total of thirty 6-8 week old male Wistar albino rats, each weighing 190-240 g, were used and divided into six equal groups, randomly. The groups were formed as control (Gr.I), cypermethrin (25 mg/kg body wt.) (Gr.II), cypermethrin (25 mg/kg body wt.) plus chrysin (50 and 100 mg/kg body wt.) (Gr. III & IV, respectively); and chrysin (50 and 100 mg/kg body wt.) (gr. V & VI, respectively). The indicated doses were given orally for 10 days. Cypermethrin and chrysin were given to the animals alone and together within the specified groups. In blood/tissue samples (brain, heart, kidney, liver, lung and testis), lipid peroxidation/oxidative stress parameters (MDA, NO, CAT, SOD, GSH and GSH-Px) and serum biochemicals (AST and ALT) and inflammatory parameters (TNF-α, IL-1β and IL-6) were evaluated. When a general evaluation is made, compared to the control group, cypermethrin considerably increased the levels of TNF-α, IL-1β, IL-6, ALT, AST in serum and MDA and NO in tissues/plasma, while significantly decreasing the levels/activities of SOD, CAT, GSH and GSH-Px in tissues/erythrocytes (P <0.05). On the other hand, in the groups co-administered with cypermethrin and chrysin, recovery changes were observed in antioxidant status/lipid peroxidation values, and serum biochemical parameters, similar to the control group. Results of this study suggest that chrysin may prevent oxidative damage and inflammation via supporting antioxidants and reducing pro-inflammatory cytokines in cypermethrin-exposed rats.

Keywords: Aspartate aminotransferase, Glutathione, Interleukin, Malondialdehyde, Pesticide toxicity, Tumor necrosis factor