PP38

The significance of thymoquinone administration on liver toxicity of diazinon and cholinesterase activity

Dr Mahmood Sadeghi Gholam-Hassan Danaei, Arian Amali, Mohammad Karami, Mohammad-Bagher Khorrami, Bamdad Riahi-Zanjani

Medical Toxicology and Drug Abuse Research Center (MTDRC), Birjand University of Medical Sciences, Birjand, Iran

Aim and objectives:

Diazinon (DZN), a widely used chemical herbicide for controlling agricultural pests, is an important organophosphorus pesticide and an environmental pollutant which induces toxic effects on living organisms during long-term exposure. Thymoquinone (TQ) is a phytochemical bioactive compound with antioxidant and anti-inflammatory properties. We aimed to evaluate the protective effects of TQ against DZN-induced hepatotoxicity through alleviating oxidative stress and enhancing cholinesterase (ChE) enzyme activity.

Methodology:

Rats were randomly divided into six groups (n=8); a negative control group receiving corn oil; a group only receiving DZN (20 mg/kg/day); a group treated with TQ (10 mg/kg/day), and three treatment groups as TQ + DZN, receiving different doses of TQ (2.5, 5, and 10 mg/kg/day). All experimental animals were orally treated for 28 consecutive days. The levels of superoxide dismutase (SOD), glutathione (GSH), malondialdehyde (MDA), alanine transaminase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and lactic acid dehydrogenase (LDH) were determined. In addition, ChE activity and histopathological changes were evaluated.

Results:

The results showed that DZN decreased GSH level (p<0.01) and SOD activity (p<0.01) in parallel to an increase in MDA level (p<0.01) and increased the activity of AST, ALT, ALP, and LDH (p<0.01) in comparison to the negative control group. Our findings demonstrated that TQ administration could diminish hepatotoxicity and reduce oxidative damage in DZN-treated rats, which could be linked to its antioxidant and free radical scavenging properties. It was also observed that TQ 10 mg/kg remarkably increased the

activity of acetylcholinesterase, butyrylcholinesterase, and SOD enzymes, elevated GSH, decreased MDA, and reduced pathological alternations of the liver induced by DZN.

Conclusions:

Thymoquinone 10 mg/kg increased the activity of plasma and blood cholinesterases and reduced DZN-induced alternations of the liver. Improvement of butyryl- and acetylcholinesterase activity suggests that maybe TQ supplement could be beneficial as pre-exposure prophylaxis among farm workers spraying pesticides.