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Antioxidant activity and hepatoprotective effects of *Centaurea incana* on CCL4-induced liver toxicity in rats

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Aim: The aim of the present study was to investigate the potential antioxidant and hepatoprotective effects of *Centaurea incana* on the free radical damage of liver caused by carbon tetrachloride in rats.

Methods: For the study of preventive effect of methanolic extract of *Centaurea incana* on CCL4-induced hepatotoxicity, our study was conducted on rats as follows: The animals were randomly divided into 4 different groups comprising of 7 animals each. Group I served as control and received an injection of vehicle (olive oil) alone; Acute liver injury in rats was induced by a single intra-peritoneal injection with CCl₄ dissolved in an equal volume of olive oil at a dose of 3 mL/kg body weight, group II, which is well documented to induce hepatotoxicity. Group III was administered methanolic extract of *Centaurea incana* at a dose of 500 mg/kg alone. In group IV, methanolic extract of *Centaurea incana* was administered at a dose of 500 mg/kg and was injected with CCl₄ i.p. at a dose of 3 mL/kg body weight. After 4 weeks of treatment, all of the animals were sacrificed 24 h after administration of CCl₄, and blood was collected, serum separated and stored at -20°C.

Results: The single intra-peritoneal injection with CCl₄ caused severe hepatotoxicity in rats, as evidenced by the significant elevation of serum AST and ALT activities after the administration of CCl₄. the concentration of MDA, an end product of lipid peroxidation, in the rats treated with CCl₄ was increased 2.7-fold when compared with the vehicle control rats. However, pre-treatment with *Centaurea incana* significantly prevented the elevation of serum AST and ALT activities induced by CCl₄ treatment. Consistent with the serum AST and ALT activities, pre-treatment with *Centaurea incana* for 4 weeks to the rats resulted in a significant decrease in the concentration of hepatic MDA when compared with the CCl₄ group.

Conclusion: Our investigation provided convincing data that *Centaurea incana* decreases the lipid per-oxidation and liver enzymes, and increases the anti-oxidant defense system activity in the CCl₄-treated rats. The mechanisms underlying hepatoprotection of the methanolic extract of *Centaurea incana* may be related to both its radical scavenging properties and indicate effects as a regulator of antioxidative systems.

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