Assessment of neurohepatic DNA damage in male Sprague Dawley rats exposed to organophosphates and pyrethroid insecticides

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Abstract:

The current work was undertaken to test the genotoxic potential of chlorpyrifos (CPF), dimethoate, and lambda cyhalothrin (LCT) insecticides in rat brain and liver using the single cell gel electrophoresis (comet assay). Three groups of adult male Sprague-Dawley rats were exposed orally to one third LD50of CPF, dimethoate, or LCT for 24 and 48 h while the control group received corn oil. Serum samples were collected for estimation of malondialdehyde (MDA) and glutathione peroxidase (GPx); the brain and liver samples were used for comet assay and for histopathological examination. Results showed that signs of neurotoxicity appeared clinically as backward stretching of hind limb and splayed gait in dimethoate and LCT groups, respectively. CPF, LCT, and dimethoate induced oxidative stress indicated by increased MDA and decreased GPx levels. CPF and LCT caused severe DNA damage in the brain and liver at 24 and 48 h indicated by increased percentage of DNA in tail, tail length, tail moment, and olive tail moment. Dimethoate induced mild DNA damage in the brain and liver at 48 h. Histopathological changes were observed in the cerebrum, cerebellum, and liver of exposed rats. The results concluded that CPF, LCT, and dimethoate insecticides induced oxidative stress and DNA damage associated with histological changes in the brain and liver of exposed rats.

Keywords:

Brain; CPF; Comet; DNA damage; Dimethoate; LCT; Liver; Oxidative stress

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