ABSTRACT

Methylparathion (MP) is an organophosphorus insecticide used worldwide in agriculture due to its high activity against a broad spectrum of insect pests. The aim of the study is to understand the effect of methylparathion on the lipid peroxidation, detoxifying and antioxidant enzymes namely catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione S-transferase (GST), total reduced glutathione (GSH), lipid peroxidation (LPO), acetylcholinesterase (AChE) and disease diagnostic marker enzymes in liver, sarcoplasmic (SP) and myofibrillar (MF) proteins in muscles, lipids and histopathological changes in various organs of Labeo rohita of size 75 ± 6g at lethal and sublethal level of exposure. The probit analysis showed that the lethal concentration (LC 50%) for 24, 48, 72 and 96h were 15.5mg/L, 12.3mg/L, 11.4mg/L and 10.2mg/L respectively which is much higher compared to the LC50 for juvenile fish. The LPO level and GST activity increased five folds and two folds respectively on exposure to methylparathion at 10.2 mg/L and the level of the enzymes increased, on sub lethal exposure beyond 0.25mg/L. AChE activity was inhibited by 74% at a concentration of 1.8mg/L and 90% at 5.4mg/L. The disease diagnostic marker enzymes AST, ALT, ALP and LDH increased by about 2, 3, 3 and 2 folds respectively at pesticide concentration of 10.2mg/L when compared to control. On sub lethal exposure, however the enzymes did not show any significant changes up to 0.5mg/L. At a concentration of 10.2 mg/L, there was a three fold increase in myofibrillar proteins while the increase in sarcoplasmic protein was above 1.5 fold. On sub lethal exposure, significant
alteration was noticed up to 30 days up to 1mg/L of methylparathion concentration. Further exposure up to 45 days increased sarcoplasmic proteins ( upto 0.5mg/L). In the case of myofibrillar proteins, noticeable changes were observed at 1mg/L concentration right from 15th day. The cholesterol content in brain tissues increased by about 27% at methylparathion concentration of 5.4 mg/L. However at 0.25mg/L sub lethal concentration, no significant alteration was observed in enzyme activity, muscle proteins, lipids and histopathology of the tissues. The results suggest that methylparathion has the potential to induce oxidative stress in fish, and that liver, muscle and brains are more sensitive organs of Labeo rohita, with poor antioxidant potentials at higher concentrations of the pesticide. The various parameters studied in this investigation can also be used as biomarkers of methylparathion exposure.

**Key words:** Labeo rohita, methylparathion, oxidative stress, biomarkers, detoxifying enzyme, disease diagnostic marker enzymes, acetylcholinesterase, muscle proteins, Lipids, histopathology.