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In vitro Estimation of Genotoxic Lesions in Peripheral Blood Lymphocytes of Rat Exposed to Organophosphate Pesticides

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Abstract : Organophosphate (OP) pesticides are among the most widely used synthetic chemicals for controlling a wide variety of pests throughout the world. Chlorpyrifos (CPF), methyl parathion (MPT), and malathion (MLT) are among the most extensively used OP pesticides in India. DNA strand breaks and DNA-protein crosslinks (DPC) are toxic lesions associated with the mechanisms of toxicity of genotoxic compounds. In the present study, we have examined the potential of CPF, MPT, and MLT individually and in combination, to cause DNA strand breakage and DPC formation. Peripheral blood lymphocytes of rat were exposed to 1/4 and 1/10 LC50 dose of CPF, MPT, and MLT for 2, 4, 8, and 12h. The DNA strand break was measured by the comet assay and expressed as DNA damage index while DPC estimation was done by fluorescence emission. There was significantly marked increase in DNA damage and DNA-protein crosslink formation in time and dose dependent manner. It was also observed that MPT caused the highest level of DNA damage as compared to other studied OP compounds. Thus, from present study, we can conclude that studied pesticides have genotoxic potential. The pesticides mixture does not potentiate the toxicity of each other. Nonetheless, additional in vivo data are required before a definitive conclusion can be drawn regarding hazard prediction to humans.

Keywords : organophosphate, pesticides, DNA damage, DNA protein crosslink, genotoxic
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