MALATHION-INDUCED CYTOGENETIC TOXICITY IN SPRAGUE-DAWLEY RATS

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Abstract: Malathion [S-(1,2-dicarboxyethoxy) ethyl-0,0-dimethyl-phosphorodithioate] is an organophosphorus compound that has been widely used as pesticide in the eradication and control of pests especially in developing countries. It is considered relatively safe for use because of its relatively low toxicity. However, impurities in commercial formulations of malathion are potent inhibitors of carboxylesterase, allowing a dramatic increase in the formation of malaoxon, its toxic metabolite. As an organophosphorus pesticide, malathion-induced toxicity is related to the inhibition of acetylcholinesterase enzyme. In acute exposure, common signs of intoxication include weakness of the muscles, respiratory dysfunction, dizziness, nausea and vomiting. Epidemiological studies suggest that individuals with chronic environmental exposures to pesticides have increased risks of various hematological malignancies. Recently, malathion has been reported to induce cytogenetic damage and point mutations. However, the genotoxic data to date have been somewhat inconclusive with regard to malathion exposure. Therefore, in this study, we investigated the genotoxic potential of malathion in bone marrow cells obtained from Sprague-Dawley rats; using mitotic index (MI) and structural chromosomal aberrations (SCA) as toxicological endpoints. Four groups of five male rats, weighing approximately 60 ± 2 g each, were injected intraperitoneally, once a day for five days with doses of 2.5, 5, 10, 20 mg/kg body weight (BW) of malathion dissolved in 1% DMSO. A control group was also made of 5 animals injected with 1% DMSO without chemical. All the animals were sacrificed at the end of the treatment period. Chromosome preparation was obtained from bone marrow cells following standard protocols. Malathion exposure significantly increased the number of structural chromosomal aberrations (CA) and decreased the mitotic index (MI) in exposed groups when compared with the control group. Our results demonstrate that malathion has a clastogenic/genotoxic potential as measured by the bone marrow SCA in Sprague-Dawley rats.

Keywords: Malathion, chromosomal aberrations, mitotic index, genotoxic, Sprague-Dawley rats.

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