The Asian Journal of Animal Science (June, 2011), Vol. 6 Issue 1 : 32-34 | RESEARCH ARTICLE

Micronucleus test as a cytogenetic marker for evaluation of genotoxicity in fish, *Labeo rohita*

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ABSTRACT

Assessment of DNA damage is of primary concern when determining the pollution-related stress in living organisms. Micronucleus assays with fish have been shown to be useful in vivo techniques for genotoxicity testing and show potential for in situ monitoring of water quality. We used *Labeo rohita* yearling to investigate the genotoxicity of potassium dichromate, a soluble form of hexavalent chromium [Cr (VI)]. To evaluate genotoxic potential of hexavelent chromium [Cr (VI)] on aquatic animals, fish *Labeo rohita* were exposed to potassium dichromate. The 96 h LC_{50} value of potassium dichromate was estimated 106.37 mg/l for the fish in a semi-static system. On the basis of 96 h LC_{50}, the sub lethal and nonlethal concentrations of the heavy metal were selected and the fish were exposed. The blood samples were collected from the exposed fish. The present study indicated that hexavelent chromium is a genotoxic agent for the acute exposure to *Labeo rohita* and Micronucleus test is a sensitive and rapid method to detect the effect.

Key words : *Labeo rohita*, DNA damage, Genotoxicity, Micronucleus test, Potassium dichromate

A variety of *in vitro* and *in vivo* assays with fish are being used as model systems for toxicological, biochemical and developmental studies (Powers, 1989). The advantages of using fish as model organisms include the ease with which teleosts, especially small aquarium species, can be held in the laboratory and exposed to toxic chemicals. Since fishes often respond to toxicants in a manner similar to higher vertebrates, they can be used to screen for chemicals that have the potential to cause teratogenic and carcinogenic effects in humans.

Al-Sabti (1994) reported the micronucleus test to determine the cytological effects of hexavalent Chromium in erythrocytes of *Carassus auratus gibelio* and *Armored* cat fish exposed to potassium dichromate. Matsumoto *et al.* (2006) reported that chromium compounds damage DNA in different ways, including DNA single and double-strand breaks generating chromosomal aberrations, micronucleus formation, sister chromatid exchanges and formation of DNA adducts.

In the present study it has been aimed to evaluate DNA damage in erythrocyte of a fish, *Labeo rohita* exposed to different concentrations of potassium dichromate. Micronucleus test was used as a Biomarker to access genotoxicity.

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MATERIALS AND METHODS

Collection and acclimatization of species:

The specimens of the fresh water fish yearlings of *Labeo rohita* (Hamilton) family Cyprinidae, order-Cypriniformes were procured from hatchery ponds of IMC. The specimens were treated with 0.05% potassium dichromate ($KMnO_4$) solution to avoid dermal infection. The fish yearlings were acclimatized to laboratory conditions before exposure to potassium dichromate. The faecal matter and other waste materials were siphoned off to reduce mortality due to ammonia concentration.

Evaluation of LC50:

The potassium dichromate ($K_2Cr_2O_7$) (MERCK, Mumbai, India; Purity 99%) was used as the test compound for determination of median lethal dose (LC50) of chromium. The LC50 value of chromium was determined by probit analysis method .The stock solution was prepared in distilled water and the required concentrations were maintained. The control group without chromium was maintained simultaneously. The mortality of fish was recorded during 96 h of exposure in each concentration of the toxicant. The data were used to estimate the LC50 of potassium dichromate.