Effect of heavy metal on the karyotype of *Channa punctatus*

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**ABSTRACT**

An experiment was set up to assess the effect of lead on the karyotype of *Channa punctatus*. The effects of lead in the form of lead nitrate was studied for 96, 120 and 144 hours at 0.012, 0.025 and 0.050 mg/l of water. The model number of chromosome was found to be 2n = 32 out of which 14 were metacentric, 8 submetacentric, 6 telocentric and 4 acrocentric. The lead nitrate induced structural chromosomal aberrations were breaks, fragments, dicentric and ring type chromosomes. Lead nitrate at a very low concentration of 0.012 mg/l and for just 96 hours of exposure can induce chromosomal aberrations in fish.

**Introduction**

Among the toxicants, industrial pollutants occupy prime position as they release heavy metals into the aquatic environment. Abel (1989) found that lead, mercury, zinc, copper and cadmium as the important heavy metals which pollute the water. A great deal of research has been done to define quantitative chemical structure versus biological activity relationship for pollutants in an aquatic environment. Little work (Alex Fraser, 1966) has been done to ascertain the genotoxic or clastogenic effects of metal ions, while the majority of the information available are on the histopathological effects of metal ions (Aruna and Gopal, 1987; Chvapil et al., 1972; Gladys *et al.* 1991; Jha and Pandey, 1989; Krishnaja *et al.*, 1987).

Majority of the fishes have larger number of 2n chromosomes and the chromosomes are acrocentric type which makes it difficult to study the genotoxic effects in fishes. However, *C. punctatus* is having small number of 2n chromosomes and the majority of the chromosomes are larger in size which makes it a suitable species for studying genotoxic effects. The present study was envisaged with the following objectives i) to study the effect of lead nitrate on normal karyotype of *C. punctatus* at different exposure intervals and at various concentration levels and ii) to compare the karyotype of the fish *C. punctatus* exposed to lead nitrate with that of control.

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Material and methods

*C. punctatus* weighing 30-50 g were used in the study. From a total of 96 fishes, four fishes each of different body size and sex were chosen at random and thus 24 groups were formed. The genotoxic effects of lead nitrate was studied at 96, 120 and 144 hours of exposure time for various dose levels (Table 1). The LC50 of lead nitrate was considered as 0.10 mg/l of water (Erichsen, 1964). The highest concentration of lead nitrate in the study was fixed as one half of the LC50 (0.050 mg/l) followed by one fourth of the LC50 (0.025 mg/l) as intermediary and one eighth of the LC60 (0.012 mg/l) as the lowest concentration.

The fishes were taken out of water after the prescribed exposure intervals and dried with the help of dry absorbant cotton cloth before dissecting. The abdominal area was disinfected with spirit. Gills, kidneys and liver were collected and immediately transferred to separate petridishes containing freshly prepared KCL hypotonic solution. The tissues were finely ground immediately after removing from the body. The finely ground tissues were kept in KCl hypotonic solution for 30 minutes at room temperature. Then these tissue suspensions were centrifuged for 10 minutes at 2000 rpm and the supernatant discarded.

A freshly prepared and chilled fixative (methanol : acetic acid (3:1)) of about 5.0 ml was added to each tube carefully along the sides of the tubes and the contents were resuspended and centrifuged for 10 minutes at 2000 rpm. Then the supernatant was pipetted out. The above step was repeated two to three times until a clear supernatant along with a mass of white cells as
Results and discussion.

The model number of chromosomes in the study was found to be $2n = 32$ consisting of 14 metacentric, 8 sub-metacentric and 4

![](Link to Fig. 1)

Fig. 1. Normal metaphase spread of *Chli aari fi*
It has been found that there was a linear relationship between the concentration of lead nitrate and percentage of spreads with chromosomal abnormalities. The percentage of spreads with a linear relationship between the concentration of lead nitrate and the percentage of spreads with chromosomal abnormalities. The percentage of spreads with chromosomal abnormalities. The percentage of spreads with dicentric ties and G1-S-4 metaphase spreads showing dicentric and r, nS chromosomes (dose: 0.025 mg/l) for 144 hours.
are acknowledged.
References


