Chromosomal Abnormalities in *Channa Punctatus* Exposed to Cypermethrin

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Abstract:
The freshwater teleost fish *Channa punctatus* were procured from local water bodies and acclimatized in the laboratory. The acclimatized fishes were divided into control and experimental groups. The fishes of experimental group were exposed to different sub lethal concentrations (0.0001, 0.0005, 0.0010 ppm) of the pesticide cypermethrin to evaluate the chromosomal abnormalities developed in kidney and gill cells due to this exposure. The values of LC50 were calculated. The maximum exposure period was 30 days during which fish were sacrificed at an interval of 5 days. After sacrificing the fish, tissue from kidney and gills was taken out and after fixation, slides of metaphase chromosome spreads were prepared. The spreads were examined to study different abnormalities developed due to exposure to cypermethrin. Chromosomal aberrations like breaks, fragments, dicentric chromosomes etc. were observed in the spreads of exposed fishes. However, there was no change in the number of chromosomes which was 32 in the cells of kidney and gills of both control and experimental fishes. Chromosome spreads of control fishes did not have such type of aberrations. It has been found that there was a linear relationship between the concentrations of cypermethrin and percentage of spreads with chromosomal abnormalities. Chromosomal abnormalities also increased with increase in exposure period. A comparison of changes in kidney and gill cells showed that kidney cells were more sensitive to pesticide exposure than gill cells. The findings of these investigations clearly reveal the genotoxic potential of cypermethrin in *Channa punctatus*. These results indicate the possibility of using fish chromosomes as indicators of genotoxic factors.

Key words: Cypermethrin, genotoxic, *Channa punctatus*, Chromosomal abnormalities.

INTRODUCTION
Fishes have survived millions of years in the most diverse, adverse and advance environment. Some substances become more toxic due to an increase in the respiratory rate there by increasing the amount of exposure of the animal to the toxin. Cypermethrin is a highly active synthetic pyrethroid insecticide. Accumulation studies have shown that Cypermethrin is rapidly taken up by fish. Cypermethrin is very toxic to fish.

After green revolution, a huge number of pesticides are used by agricultural sector which get washed into the water, fish which inhabits water, forms the major resource as food to mankind is in turn affected both by yield and quality (Manna, 1986) Although the study concerning the effect on histological, biochemical and toxicity studies of fish are of interest. Therefore the present investigation has been under taken to study the genotoxic effect of synthetic pyrethroid pesticide on the fish *Channa punctatus* (Arockia, et. al. 1998)

Chromosomal aberration in some animals (including fish) in the wild serve as useful indicators of the presence and action of pesticide that cause structural aberrations in fish chromosomes (Ulupinar and Okumus, 2002)

MATERIAL AND METHODS
The metaphase aberration test is one of the chromosome aberration tests. The purpose of the aberration test is to identify agents that cause structural chromosomal aberrations in cells. Chromosome mutations and related events are caused due to many genetic diseases. Fish were caught from local water bodies, transported to laboratory and acclimatized in an aquarium with well oxygenated & dechlorinated water.

After acclimatization fishes were classified into four groups of 16 fishes each and were used for treatment with Cypermethrin (0.0001, 0.0005 and 0.0010 ppm) in 25 liters of water, or 24, 48, 72, 96, 120 and 144 hours against parallel tap water controls.

Chromosomal preparations were made following standard method developed by Klingerman (1982). The test fish were injected 0.05% colchicine (1ml per 100 g body wt.). The fishes were left for 2 hrs. After time duration the anterior part of kidney was excised from the treated fish and was placed in 0.56% KCl (hypotonic solution) for 30min. Carnoy’s fixative was used to fix the tissue. Slides were prepared by dropping method and then stained with 6% Giemsa. The data obtained was analyzed statistically.
RESULTS & DISCUSSION

The diploid number of chromosomes in both sexes of Channa punctatus has been found to be 32. No sex chromosomes were observed in this fish. These observations are in agreement with the earlier data (Rishi and Haobam, 1990 and Rishi and Grewal, 1995).

The frequency of chromosomal aberrations induced by Cypermethrin for different period of exposure was recorded. It was observed that after an exposure of 144 hrs the percentage of chromosomal aberrations in treated fish was increased against the control.

The present data indicate that the frequencies of chromosomal abnormalities were higher during the initial period of exposure and thereafter declined. However, they were still higher than the control. (Manna and Mukherjee, 1986). It was found that as the exposure time increased the percentage of chromosomal abnormalities also increased. When the fishes were exposed to 96 hours the metaphase spreads had only two types of abnormalities. Chromosomal breaks were found more compared to any other type chromosomal abnormalities when fish were exposed to 144 hrs. (Mathew, et al. 1999). The present results on the induction of breaks, chromatid gaps, centromeric gaps, acentric fragments ring type deletion by Cypermethrin are similar to those observed by Biswas and Manna (1989, 1992).

REFERENCES


