

Chlorpyrifos pesticide toxicity on erythrocyte sedimentation rate in fish, *Channa punctatus* (Bloch.)

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Abstract

Almost all the pesticides and more particularly the synthetic pesticides used, find their way into water bodies alter the metabolism of aquatic organisms. It is known long back. In the present investigation, the effect of sub-lethal concentration of chlorpyrifos toxicity on fish *Channa punctatus* were studied after 24hrs, 48hrs, 72hrs and 96hrs exposure respectively. Chlorpyrifos is an organophosphate insecticide that kills insects by disrupting their nervous system and is effective against a wide range of plant-eating insects. Suspected effects of chlorpyrifos exposure include birth defects, increased rate of leukemia and immune system abnormalities. The results indicated a significant increase in ESR (mm/hr) 2.57mm/hr, 2.60mm/hr, 2.71mm/hr and 2.83mm/hr when compared to control group 2.56mm/hr following both acute and sub-acute exposure of chlorpyrifos.

Keywords: Chlorpyrifos, Erythrocyte sedimentation rate, *Channa punctatus* (Bloch.).

Introduction

The application of various pollutants such as pesticides, heavy metals etc. in the aquatic environment and their deposition in the biotic system is known to cause several structural and functional changes in the biota. On the other hand, role of pesticides in promoting our health and economy are closely related. Pesticides have brought tremendous benefits to mankind by increasing food production and controlling the vectors of man and animal diseases. At the same time, the use of these pollutants has posed potential health hazards to the life of fishes. Blood is highly susceptible to internal and external environment fluctuations because it is the vehicle for the transport of such pollutants (Blaxhall, 1972, Larsson, 1975). The toxic effect of pesticides to the blood of fishes has been studied by many workers. (Dawson, 1935, Goel and Maya, 1986). In the present investigation, the toxicity of chlorpyrifos has been observed on Erythrocyte sedimentation rate (ESR) (mm/hr) in fish, *Channa punctatus* (Bloch.).

Materials and Methods

Live specimens of *Channa punctatus* were collected from the local fish market and were transferred into glass aquaria containing 25 lit. of chlorine free water for acclimatization after dipping them into low concentration of potassium permanganate for a few seconds in order to check microbial infection. The determination of LC₅₀ was analyzed statistically by log dose/probit regression line method (APHA, 1971). Fishes were sacrificed after 24,

48, 72 and 96hrs respectively. 800mg of potassium oxalate and 1200mg of ammonium oxalate were dissolved in 100ml distilled water. One drop of this solution was added to each empty sterilized vial, shaken and dried in an oven.

Results

Many significant changes were induced by the chlorpyrifos toxicity in the haematological parameters like erythrocyte sedimentation rate (ESR) of fish, *Channa punctatus* (Bloch.) as shown in table-1. The ESR (mm/hr) ranges from 2.41 to 2.75 mm/hr with an average of 2.56mm/hr. An increase in ESR (mm/hr) from 2.57mm/hr to 2.83mm/hr for 24hrs to 96 hrs respectively was recorded in 10ppm of chlorpyrifos concentration, when compared to control group. Similar increase in ESR (mm/hr) from 2.61mm/hr to 2.86mm/hr for 24hrs to 96 hrs respectively was recorded in 15ppm of chlorpyrifos concentration when compared to control to control group.

Discussion

An increase in the ESR (mm/hr) for both 10ppm and 15ppm concentration is due to chlorpyrifos toxicity and exposure time. An increase in ESR (mm/hr) has been reported in *Clarias batrachus* after exposure to savin (Kumar and Benerjee, 1990) and alachlor and rogor exposed in *Heteropneustes fossilis* (Chaturvedi and Agarwal, 1975). An increase in ESR (mm/hr) may be due to increase in the concentration of fibrinogen which develops into fibrinogenemia

due to chlorpyrifos exposure (Singh and Bhati, 1991). However, decrease in ESR (mm/hr) was also observed in *Notopterus notopterus* after chlordane and Malathion exposure (Gupta *et al*, 1995). It is found to be true in present study that

ESR is negatively correlated with total erythrocyte count i.e. lower the total erythrocyte count higher will be the ESR. Increased ESR is medically considered.

Table 1: ESR (mm/hr) in the blood of *Channa punctatus* (Bloch.) after chlorpyrifos treatment.

Conc. in ppm	Control (Mean±S.Em.)	24hrs. (Mean±S.Em.)	48hrs. (Mean±S.Em.)	72hrs. (Mean±S.Em.)	96hrs. (Mean±S.Em.)
10ppm	2.56±0.059	2.57±0.022*	2.60±0.030*	2.71±0.021**	2.83±0.018***
15ppm	2.56±0.059	2.61±0.027*	2.66±0.028*	2.74±0.024**	2.86±0.014***

S.Em. = Standard Error of mean
 ppm = parts per million
 *Non-Significant. (p>0.05)
 **Significant. (p<0.05)
 ***Highly Significant. (p<0.01)
 ****Very highly Significant. (p<0.001)

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