

## An assay on the effect of indofil toxicity on the total serum protein content of *Channa punctatus* (Bloch)

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### Abstract

The experiment was conducted on freshwater teleost fish, *Channa punctatus* (Bloch.), to study the effect of fungicide–Indofil on certain haematobiochemical parameter i.e., total serum protein. Indofil is a carbamate fungicide and is used by the farmers to protect their crops. This fungicide reaches to the aquatic ecosystem by direct or indirect means and affects the aquatic fauna. LC<sub>50</sub> of Indofil for *C. punctatus* has been calculated by the log-dose/probit regression line method (Finney, 1971) and recorded as 10.96ppm. Total serum protein content was estimated by Dumas method (1971). Four sub-lethal concentrations (0.2ppm, 0.3ppm, 0.5ppm and 1.1ppm) were selected to expose the fish for 15, 30, 45, 60, 75, and 90days. Changes in total serum protein were observed with all concentrations and exposure period. Total serum protein was decreased from the control set. At 15th, 30th and 45th day the decrease was non-significant in all concentrations, while at 60th day the decrease was highly significant in 0.2ppm and 0.3ppm, while very highly significant in 0.5ppm and 1.1ppm treated groups. At 75th and 90th day the decrease was very highly significant in all concentrations. Thus a non-significant to very highly significant decrease in total serum protein content was observed from 15th to 90th day due to toxic effect of Indofil. So, human population is on high risk by consuming these toxicated fishes.

**Keywords:** Teleost, *Channa punctatus*, Carbamate, Fungicide, Indofil, Sub-lethal, Haematobiochemical, LC<sub>50</sub>, Total serum protein.

### Introduction

The cry of pollution is heard from all the nooks and corners on global level. It has become a major challenge and threat to the very existence of mankind on the earth. The degradation of aquatic system is a world wide phenomenon originated from the intense population and from the corresponding increase in agriculture practices as well as industrial and domestic activities. Pesticides are major cause of concern for aquatic environment because of their toxicity, persistency, and tendency to accumulate in the organisms. The impact of these pesticides on aquatic organisms is due to the movement of pesticides from various diffuse or point sources. These pesticides are posing a great threat to aquatic fauna especially to fishes, which constitute one of the major sources of protein rich food for mankind (Sharma and Singh, 2007).

The fish serves as bio-indicator of water quality and the impact of the pesticide can be well understood by analyzing either blood or serum of the fish, because blood is a pathophysiological reflector of whole body (Sharma and Singh, 2004; 2006). In the present study, the teleost fish, *Channa punctatus* was investigated to evaluate the effect of carbamate fungicide indofil on total serum protein content of that fish.

### Materials and Methods

The experimental fishes, *C. punctatus*, were procured from the local vicinity and introduced into clean large glass aquaria measuring 75cms x 37.5cms x 37.5cms at the temperature ranged from 30±5°C and containing 25L of dechlorinated water. The average length and weight of fish ranged from 14-16cms and 60-70gms respectively. The fishes were acclimatized to the laboratory conditions for seven days prior to experiment. They were fed on commercial fish food which was given daily at morning hours.

For LC<sub>50</sub> determination, the fishes were grouped into four groups (A, B, C and D), having six fishes each. Different concentrations viz; 10ppm, 20ppm, 30ppm, and 40ppm were given to A, B, C, and D groups respectively. All groups were observed for 24, 48, 72, and 96hrs and mortality was recorded. LC<sub>50</sub> of indofil was calculated by the log-dose/Probit regression line method (Finney, 1971) and was recorded as 10.96ppm.

The test fishes were grouped in four groups (A<sub>1</sub>, B<sub>1</sub>, C<sub>1</sub>, and D<sub>1</sub>) having four different sub-lethal concentrations (A<sub>1</sub>= 0.2ppm, B<sub>1</sub> = 0.3ppm, C<sub>1</sub> = 0.5ppm, and D<sub>1</sub> = 1.1ppm) for specific time of period (15, 30, 45, 60, 75, and 90days). Simultaneously a control set was run to compare the toxicated values of total serum protein which was estimated by Dumas method (1971). The blood samples

were collected after severing the caudal peduncle and taken in sterilized centrifuge tubes and allowed to stand for about one hour, then centrifuged at 2000rpm for 30 minutes.

The supernatant was separated by a fine rubber bulb pipette in separate test tube and was used for the estimation of total serum protein content.

Total serum proteins were calculated by the following formula:

$$\text{Total serum proteins (gm/dl)} = \frac{\text{Reading of 'Test'}}{\text{Reading of 'Standard'}} \times 6.5$$

Students' 't' test was used for the Probit analysis.

## Results

In *C. punctatus*, the total serum protein content was decreased from the control set. At 15th, 30th, and 45th day, the decrease was non significant in all the concentrations, while at 60th day, the decrease was highly significant in 0.2ppm and 0.3ppm, while very highly significant in 0.5ppm and 1.1ppm treated groups. At 75th and 90th day, the decrease was very highly significant in all the concentrations (Table 1). So a non significant to very highly significant decrease in total serum protein content was observed from day 15th upto day 90th due to the toxic effect of indofil.

## Discussion

Proteins are indispensable constituents of the body and their metabolism is almost confined to the liver. Fall in serum protein level may be due to impaired function of kidney or due to reduced protein synthesis owing to liver cirrhosis (Garg *et al.*, 1989; Ravichandran *et al.*, 1994 and Kumari and Kumar, 1995).

Das *et al.* (2004) stated that reduction of protein content in serum occurs due to shrinkage and lysis of RBCs causing plasma dilution and/or protein catabolism where structural protein converts to energy. According to Radha *et al.* (2005) the reduction of protein content may be due to increased proteolytic activity and decreased anabolic activity of protein as observed by Jenkins *et al.* (2003).

## Conclusion

From the present study, it is assumed that reduction in total serum protein content induces proteinaemia and may be correlated with reduced protein synthesis by liver. Long term exposure of organisms to pesticides means a continuous health hazard for the population. So, human population is at high risk by consuming these toxicated fishes. Protection against their effects needs sensitive markers of exposure.

**Table 1:** Total serum protein in *C. punctatus* (Bloch.) after treating with Indofil

Days	No. of experimental fishes	Control (gm/dl) Mean±S.Em	Treated (gm/dl)			
			Mean ± S.Em			
			0.2ppm	0.3ppm	0.5ppm	1.1ppm
15	6	4.18±0.05	4.16± 0.05 *	4.16±0.05 *	4.13±0.05 *	4.10±0.05 *
30	6	4.19±0.01	4.13± 0.05 *	4.13±0.05 *	4.11±0.05 *	4.06±0.05 *
45	6	4.20±0.01	4.12± 0.05 *	4.11±0.05 *	4.08±0.06 *	4.07±0.06 *
60	6	4.26±0.01	4.08±0.05 ***	4.06±0.05 ***	4.02±0.05 ****	3.95±0.01 ****
75	6	4.29±0.01	4.04±0.04 ****	4.03±0.04 ****	4.00±0.04 ****	3.91±0.01 ****
90	6	4.30±0.01	3.97±0.05 ****	3.97±0.03 ****	3.95±0.01 ****	3.87±0.01 ****

S. Em = Standard Error of mean  
ppm = parts per million

\*Non significant (P > 0.05)

\*\*\*Highly significant (P<0.01)

\*\*\*\*Very highly significant (P<0.001)

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