

**ASSESSMENT OF TOTAL PROTEIN CONCENTRATION IN LIVER OF FRESH WATER FISH, CHANNA PUNCTUATES (BLOCH.) WITH SPECIAL REFERENCE TO AN ORGANOPHOSPHATE INSECTICIDE, CHLORPYRIFOS**

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**ABSTRACT**

Chlorpyrifos an organophosphate insecticide are being promoted world wide. on large scale day by day. Recently, a great deal of attention has been paid to evaluate the hazardous influence of an organophosphorous compound on physiology of many non-target organism, Particularly the fish. In the present study, the effect of an organophosphate insecticide (Chlorpyrifos) on total protein concentration in the liver of fish was assessed. Liver, being the main site of metabolism in the body of fish and is highly active in both toxifying and detoxifying foreign substance, was selected for the study. The determination of LC<sub>50</sub> for chlorpyrifos insecticide was analyzed statistically by log dose/ probit regression line method (APHA, 1971). Fishes were exposed to 4 pm, 8ppm 12 ppm and control for 15 and 30 days, respectively. There was a significant (P<0.05) alterations between the control values and the exposed groups. The alteration in total protein concentrations was significantly, (P<0.05) dose dependent.

## KEY WORDS

Total protein concentration, fish *Channa punctatus* (Bloch) and organophosphate insecticide (chlorpyrifos).

## INTRODUCTION

The application of various pollutants such as pesticides heavy metals etc in the aquatic environment and their depositions in the biotic system is known to cause several structural and functional changes. Pesticides are unusual among environmental pollutants in that they are used deliberately for the purpose of killing harmful insects pests. The aquatic ecosystem as a greater part of the natural environment is also faced with the threat of a disturbing genetic base and biodiversity due to the indiscriminate use of pesticides (Rehman et al 2002).

Pesticides become easily available in the food chain and subsequent accumulation in both aquatic and terrestrial flora and fauna (Mellanby, 1967) with possible unquantifiable disastrous consequences are possible on the ecosystem (Terry, 1987) Due to the residual effects of pesticides, important organ like liver and kidney are damaged in fishes. (Rahman et al 2002) Hence, the role of any pesticide can be well understood by analyzing either tissue or blood of an animal species. The intake of insecticides affects the biochemical composition of fishes (Jebkumar et al, 1990 & Prasad et al, 2002). It has been shown by many scientists that insecticide mainly affects liver in fishes (Anthony et al, 1986 & Bhushan et al, 2002).

Chlorpyrifos, an organophosphate insecticide is one of the most used insecticides in terms of volume. It kills insects by disrupting their Nervous system and is effective against a wide range of plant eating insects. It has been in use around more than 35 years, and is used in present work. In agricultural products, it is known as Lorsban, while in non-agriculture it is called as Dursban. Suspected effects of chlorpyrifos exposure include birth defects, immune system abnormalities and increased rate of leukemia.

A predatory carnivore's murrel, *Channa punctatus* (Bloch.) is also known as *opheocephalous punctatus* of Day. It forms an important group of economic species which besides breathing through gills. In the present study, the teleost fish, *Channa Punctatus* (Bloch) was investigated to assess the effect of chlorpyrifos on total protein concentration in liver. Liver, being the main site for the absorption of foreign substance and is highly active in both toxifying and detoxifying insecticides was selected for the present investigation.

## MATERIALS AND METHODS

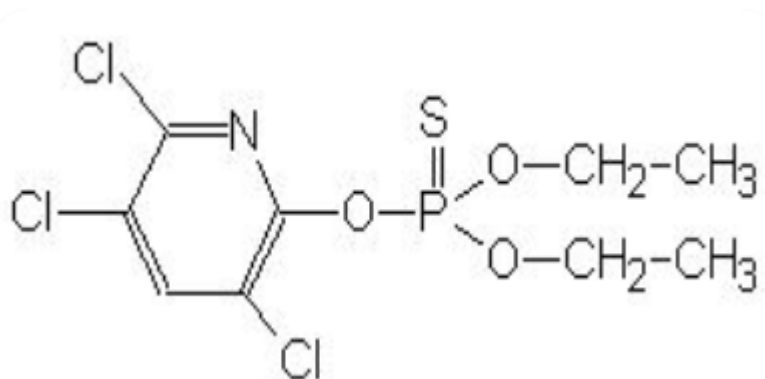
Live specimen of *Channa punctatus* were collected from the local fish market and were transferred into glass aquaria containing 25 liters of chlorine free water for acclimatization after dipping them in a low concentration of potassium permanganate for few seconds in order to check micro wave infection. An organophosphate insecticide, chlorpyrifos ( $C_9H_{11}C_{13}NO_3PS$ ) was selected for present study. It is known as Dursban in trade formulation and its chemical Name is O,O-diethyl O-3, 5,6 trichloro - 2-pyridyl phosphorothiate (Fig-1). The determination of  $LC_{50}$  was analyzed statistically by log dose / probit regression line method (APHA, 1971) fishes were sacrificed after 4ppm, 8 ppm, and 12 ppm concentration respectively. 800 mg of potassium oxalate and 1200 of ammonium oxalate were dissolved in 100ml of distilled water. One drop of this solution was added to each empty sterilize vial. To assess the effect of chlorpyrifos the fish *Channa punctatus* (Bloch)

were grouped into four sets. Three experimental and one control.

The *Channa punctatus* fishes were killed under light chloroform anaesthetized (Mittal & Whitear, 1978) they were dissected carefully and liver was taken out, weighed for the biochemical estimation of total protein concentration.

The estimation of total protein concentration in liver was done by biuret kit method described by Dumas (171) Total protein concentration in liver was calculated by the following formula

$$\text{Total Protein (mg/dl)} = \frac{\text{Optical density of 'test'}}{\text{Optical density of 'standard'}} \times \text{conc. of standard (7.2)}$$



**Figure-I**  
**(Chemical Structure of chlorpyrifos)**

## RESULTS

At 27<sup>0</sup> C(Lab. condition) many significant change were induced by the chlorpyrifos toxicity in total protein concentration of fish, *Channa punctatus* (Bloch.) as shown in table I. the total protein concentration (mg/dl) ranged from 150.35 mg dl to 160.45 mg/dl with in average of 155.40 mg/dl. The total protein content in liver at 4ppm chlorpyrifos were recorded as 151.30 mg/dl and 135.11 mg/dl after exposure time of 15 and 13 days. At 8ppm chlorpyrifos concentration, the total protein content were recorded as 148.22 mg/dl and 130.17 mg/dl after exposure time of 15 and 30 days respectively. While at 12 ppm chlorpyrifos

concentration, the total protein content were recorded as 145.41 mg/dl and 118.14mg/dl after exposure time of 15 and 30 days respectively.

The decrease in total protein content in liver recoded in liver recorded when compared with control group was significant (P<0.05) after 15 days and highly significant (P<0.01) after 30 days at 4ppm chlorpyrifos concentration while at 8ppm and 12 ppm concentration, the decrease in total protein recorded when compared with total group (155.40 mg/dl) was highly significant (P<0.05) after 15 days and very highly significant (p<0.,01) after 30 days

**Table-I**  
**Total protein (mg/dl) in the liver *Channa Punctatus* (Bloch) after chlorpyrifos treatment of 4ppm, 8ppm and 12ppm.**

<b>Conc. In Ppm</b>	<b>Range</b>	<b>Control (M±S.Em)</b>	<b>15 days (M±S.Em)</b>	<b>30 days (M±S.Em)</b>
4 ppm	150.35-160.45	155.40±4.22	151.30±2.20**	135.11±1.91***
8ppm	150.35-160.45	155.40±4.22	148.22±2.08***	130.17±1.70***
12ppm	150.35-160.45	155.40±4.22	145.41±1.90***	118.14±1.21****

\* **Non Significant (p<0.05)**  
 \*\* **Significant (p<0.05)**  
 \*\*\* **Highly Significant (p<0.01)**  
 \*\*\*\* **very Highly significant(p<0.001)**

**M= Mean**  
**S.Em= Standard error of mean**  
**ppm: part per million**

## DISCUSSION

The total protein concentration in liver of fish, *Channa punctatus* (Bloch) ranged from 150.35 mg/dl to 160.45 mg/dl with an average of 155.40 mg/dl. A significant decrease in total protein content from 155.40 mg/dl has been recorded due to toxic effect of sub lethal concentration of 4ppm, 8ppm, 12 ppm chlorpyrifos at time exposure of 15 days and 30 days. The decrease in total protein was also reported by Shuka et al (2005) in claries *batrachus* due to toxic effect of folidol. Revathi and Binadhuja (2008) also reported a decrease in total protein in *M. Malcolmsoni* exposed in profenofos and Sharma et al (2000) also showed a decrease in total protein in liver of *Channa punctatus* (Bloch) due to toxicity of indofil. Protein are indispensable constituents of the body and their metabolism is almost confined to the liver. Fall in total protein level may be due to reduced protein synthesis owing to liver cirrhosis (Kumari and Kumar, 1995)

Protein are complex substance of high molecular weight consisting of and alpha amino acid united in peptide linkage and placed and important role in the maintenance of blood

glucose and energy sources to with stand during chronic period of stress. It is the most fundamental and dominant biochemical constituent present in fishes.

In the present study decrease in total protein resulted into the increased rate of proteolytic activity or repeated break down of protein to yield energy due to stress. The quantity of protein is dependent on ht rate of protein synthesis or on the rate of its degradation. It may also be affected due to impairment incorporation of amino acid in to polypeptide chain (Malla, 2010) the present findings are in agreement with previous reports of decreased level of protein on exposure to chlorpyrifos.

## CONCLUSION

So we come to conclusion that reduction in total protein concentration resulted into the increased rate of proteolytic activity or repeated break down of protein to yield energy due to stress of pesticides

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