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EVALUATION OF IMPACT OF PHOSPHAMIDON ON PROTEIN STATUS OF FRESHWATER FISH *Channa punctatus*

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ABSTRACT

In present study, an evaluation of impact of Organophosphate pesticide Phosphamidon on protein content of fish *Channa punctatus* was carried out. After determination of $LC_{50,}$ the sublethal concentration of phosphamidon (0.005ml/lt) was used for toxicity experiment and soluble and insoluble protein content of different tissues such as muscle, liver, kidney and blood at 24, 48, 72 and 96 hrs exposure was studied. It was found that there was a decreasing trend of both soluble and insoluble proteins up to the end of experiment but maximum decrease was found at 48 hrs. This might be due to proteolytic activity after that there was some rise in level especially in blood and liver suggesting the increased enzyme synthesis to cope with toxic stress.

KEY WORDS: Phosphamidon, *Channa punctatus,* LC_{50}

The pollution has become a major challenge and threat to the very existence of mankind on the earth. The degradation of aquatic system is a worldwide phenomenon originated from the intense population and corresponding increase in agricultural practices as well as industrial and domestic activities. These pollutants are posing a great threat to aquatic fauna, especially to fishes (Ghosh et al., 2006; Palanichamy et al., 1989; Abdul et al., 2010; which constitute one of the major sources of protein rich food for mankind. A Review of the toxicological literature (Rao et al., 1987, Reddy and Philip, 1991) reveals that the exposure to the toxic chemicals can produce unexpected effects in nontarget organisms. Pesticides and other pollutants affect the physiological and biochemical parameters of fishes.

The fish serves as bioindicator of water quality and the impact of pesticides can be well understood by analyzing the biochemical parameters of different tissues of it. As protein budget of a cell can be taken as an important diagnostic tool in the evaluation of its physiological state.

In present study, an attempt has been made to investigate the status of protein in fish *Channa punctatus* after exposure to organophosphate pesticide phosphamidon.

MATERIALS AND METHODS

Fish *Channa punctatus* were selected for experiment as they have economic value and available throughout the year. The fishes were procured from wadali, a local tank near Amravati city. The fishes used were having the average length 12 to 15 cm and the weight about 50 to 70 gm. Fishes were disinfected with 1% $KMnO_4$ solution and acclimatized at laboratory conditions in glass aquarium for seven days and Fishes were divided into two groups as control and experimental. Experimental fishes were transferred into aquarium containing test solution. For that the test solution prepared was the sublethal concentration i.e.; one fourth of concentration of LC_{50} (0.005ml/lt.)

The control group of fishes was maintained simultaneously in dechlorinated tap water in separate aquarium. The experimental fishes were sacrificed after 24, 48, 72 and 96 hours. The tissues of both experimental and control fishes such as blood, liver, muscle and kidney were taken for the estimation of soluble and insoluble proteins by Lowery's et al., 1993.

The readings obtained were expressed as mg protein per gram weight wet tissue. The difference in protein content of the normal and pesticide treated tissue was tested for the significance using student 't'

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test(Mahajan, 1997) and percent decrease or increase over the control was calculated for each value.

RESULTS AND DISCUSSION

In present study, an attempt has been made to examine the sublethal toxic effect of organophosphate pesticide phosphamidon on protein metabolism in terms of tissue proteins in fish. There is significant decrease in both soluble and insoluble proteins in muscle, liver, kidney and blood tissues of the fish *Channa punctatus* after 24 hours exposure relative to control. Maximum decrease for soluble and insoluble proteins is observed at 48 hours exposure in all the tissues but soluble protein in blood (-74.98%) and in liver (-67.79%) shows highest depletion in protein levels as compared to kidney (-52.18%) and muscle (-42.00%) tissue. Insoluble proteins of blood (-74.11%) and liver (-58.6%2) also show similar trend. After 48 hours there was gradual increase in both soluble and insoluble protein content and at 96 hours the protein content of all tissues was near about but less than the protein content of respective tissues of control fishes. The muscle and kidney tissue had pronounced decrease in protein level also at 72 hrs but at 96 hrs protein levels elevated (Table-1, Figure-1).

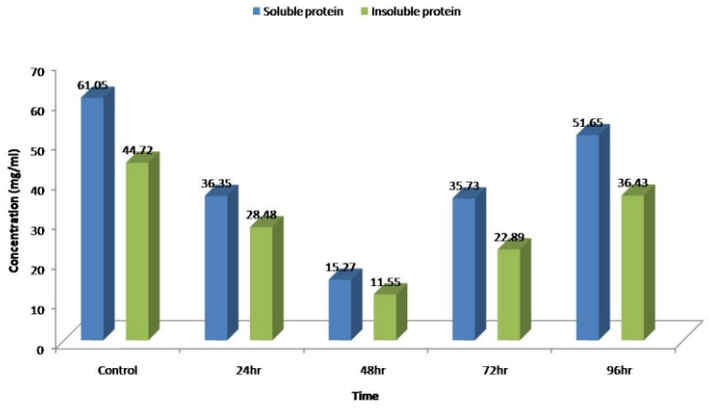
The survival ability of animals exposed to stress mainly depends on their protein synthetic potential. The degradation of protein suggests the increase in proteolytic activity and possible utilization of their products for metabolic purposes and cause damage to tissues. (Mastan and Rammayya, 2010). Similar decreasing trend was also

Table 1: Changes in protein level in different tissues in fish treated with sublethal concentration of Phosphamidon

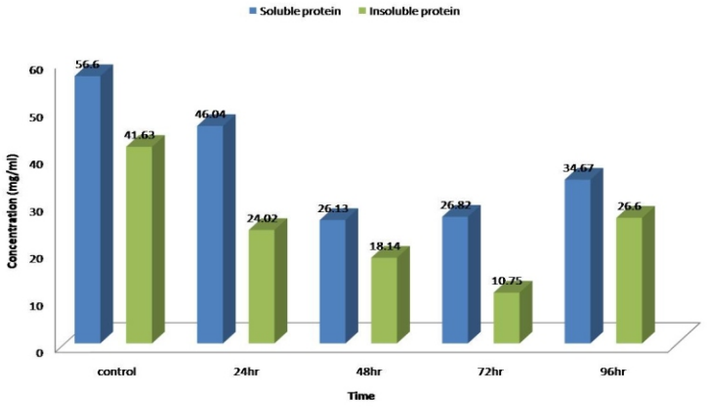
S. No.	Tissue	protein mg/ml	Control	Experimental			
				24hr	48hr	72hr	96hr
1	Muscle	Soluble	35.41±1.24	30.27±1.58 (-14.5)***	20.47±1.86 (-42.00)	16.82±1.49 (-52.49)*	30.44±1.41 (-14.03)
		Insoluble	69.90±2.87	55.80±4.24 (-20.17)	24.33±2.04 (-65.19)	35.96±3.70 (-48.55)	60.75±2.12 (-13.90)
2	Kidney	Soluble	56.6±1.61	46.04±2.19 (-15.67)***	26.13±1.80 (-52.18)	26.82±1.70 (-50.87)	34.67±3.42 (-36.5)
		Insoluble	41.63±3.14	24.02±1.58 (-42.16)	18.14±2.57 (-56.32)**	10.75±1.86 (-74.11)	26.60±2.33 (-35.94)
3	Liver	Soluble	66.98±1.73	43.40±2.28 (-35.20)***	21.57±1.68 (-67.79)	36.29±1.53 (-45.81)	47.00±1.16 (-29.82)
		Insoluble	51.07±2.71	31.59±2.86 (-38.14)	21.13±2.02 (-58.62)	36.67±1.92 (-28.19)	51.30±2.76 (-0.45)
4	Blood	Soluble	61.05±2.09	36.35±2.56 (-40.45)	15.27±1.68 (-74.98)	35.73±2.33 (-41.47)	51.65±1.90 (-15.39)
		Insoluble	44.72±2.40	28.48±1.73 (-36.31)	11.55±1.31 (-74.17)	22.89±2.30 (-48.81)	36.43±1.87 (-18.53)

***Indicates $p<0.01$, ** $p<0.025$, *$p<0.05$, level of significance. values in parenthesis indicates % Change

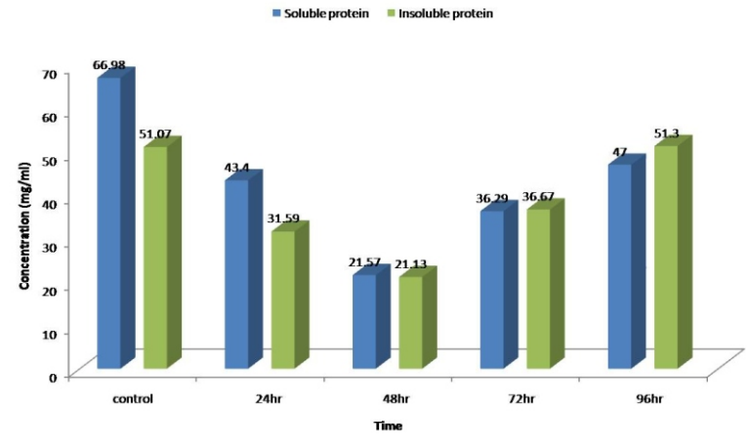
Figure 1: Graphical Changes in protein level in different tissues in fish treated with sublethal concentration of Phosphamidon



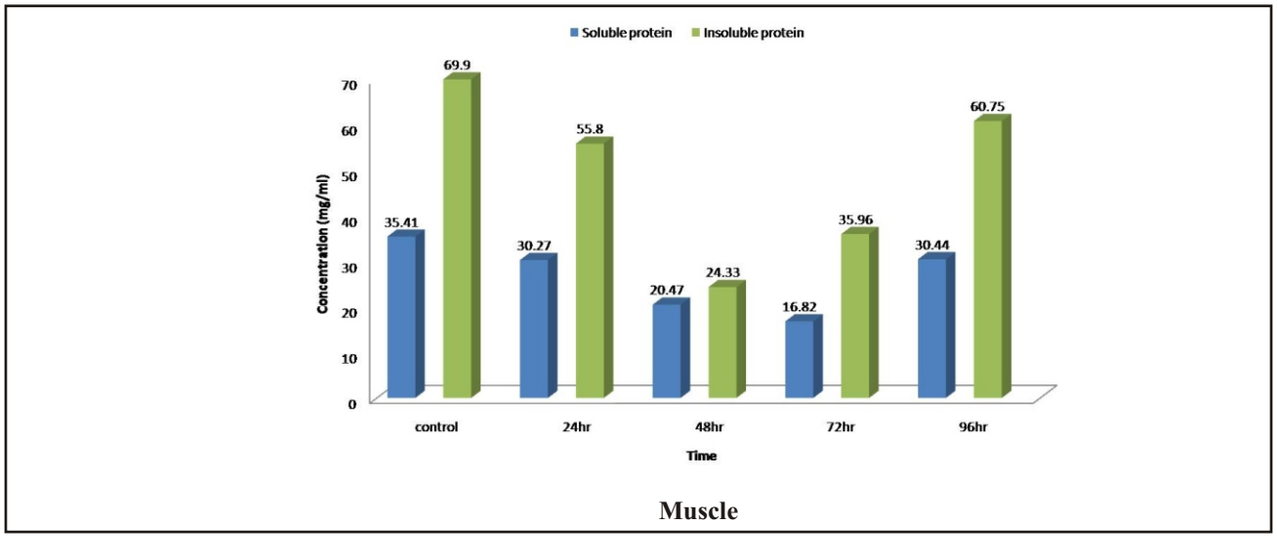
Blood



Kidney



Liver



Muscle

observed by Rao et al., 1987; Palanichamy et al., 1989, Sheela et al., 1992; Ghosh et al., 2006).

Increasing level of soluble and insoluble protein content in all tissues after 48 hours may be due to the induction of microsomal enzymes for detoxification of extraneous material and other constituent enzymes of various metabolic processes (Mukhopadhyay and Dehadrai, 1980; Anand et al., 2010). Increase in both soluble and insoluble proteins could help the organs for developing resistance to the imposed toxic stress and similar increase in soluble protein fractions could indicate Initiation of synthesis of enzymes necessary for detoxification.

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