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EFFECT ON AMYLASE ACTIVITY OF *LABEO ROHITA* EXPOSED TO ORGANOPHOSPHATE INSECTICIDE ACEPHATE

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KEYWORDS

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ABSTRACT

The present study was undertaken to the effect of formulated grade of organophosphate insecticide, Acephate affect on amylase activity. The fishes were exposed to lethal and sub lethal concentration of 3000ppm for 96hr and 1/10th and 1/20th concentration for 30 days. The lethal and sub lethal toxic effect of acephate shows its effect on amylase activity in freshwater fish *Labeo rohita*. The results shows the acephate significantly affect on aquatic environment and significantly decreased amylase activity in *Labeo rohita* after acute and chronic exposure. It indicates the interference in the regular digestion process which ultimately affected fish health.

INTRODUCTION

Rapid industrial development, urbanization and modern agricultural practices have encouraged more and more usage of pesticides (Sharan *et al.*, 2015). Excess use of pesticide in agriculture to the control the pests have creates the problem of aquatic organisms. Organophosphate pesticides are most preferred to eradicate plant diseases and control insects and pests due to their low persistence in the environment. Pesticides used to destroy, repel, attract, or reduce pest organism, prevent the plant diseases for raise in crop production. They find use in different areas of agriculture and domestic use, forestry, etc (Sivaperumal, 2008). Contamination of water by agrochemicals like insecticides are mainly due to intensive agriculture combined with surface runoff and subsurface drainage, usually within few days or weeks after application. In fish, different insecticides can be absorbed through gills, skin or alimentary ducts (Banaee, 2013).

Fishes are aquatic vertebrates used as environmental bio indicator of pollution (Mitev *et al.*, 2013). Fishes are very sensitive to contamination and pollutants may damage some physiological, metabolic, biochemical activities in fishes.

Digestive enzymes play a vital role in digestive physiology in fish species, reflecting the enzyme profile closely related to its feeding habits and its capacity to absorb, hydrolyze and assimilate the primary dietary nutrients (Fernandez Gimenez *et al.*, 2001). Enzymes are essential for regular cellular metabolism. Enzyme activities are considered as sensitive biochemical indicators of toxic effects in fish and have been used as important parameters in analysis of water for presence of contaminants (El-Demerdash and Elagamy, 1999 and Oruc and Uner, 1999).

Increasing use of chemical pesticides results in the excess influx of toxic chemicals into the aquatic ecosystem (Baskaran *et al.*, 1989; Kalavathy *et al.*, 2001). In present investigation, the evaluate effect of acephate on amylase activity of intestine in *Labeo rohita* and very little work on toxicity of acephate, therefore present work has been an attempt to assess the changes in amylase activity.

MATERIALS AND METHODS

Experimental design

Freshwater fish species *Labeo rohita* were brought from the Government Fishseed Production Centre, Dhom, Tal-Wai, Dist- Satara. The fish weighing 8 ± 1 gm and length 7 ± 1 cm respectively were collected and acclimatized to laboratory conditions for seven days in glass aquaria. Before acclimatization, they were disinfected by 0.5% KMNO₄ solution. Fishes were fed with deoiled groundnut oil cake at the rate of 2% of body weight daily and feeding was stopped 24 h prior to experimental setup. Acclimatized fishes were separated in two group's viz. control and treated containing 10 fishes in each aquarium. Asataf 75% SP commercial grade of Acephate was used as toxicant for present study. The fishes were exposed to a lethal concentration of 3g/L for acute study (96hours) and sublethal concentrations of 1/20th and 1/10th values were used for chronic study of 30 days.

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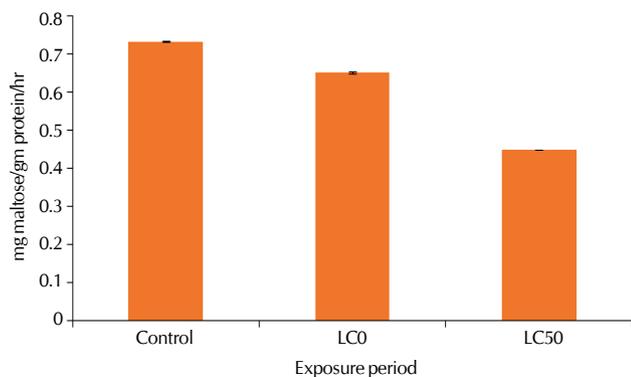


Figure 1: Amylase activity in intestine of *Labeo rohita* exposed to acephate for acute exposure

Tissue sampling

The fishes were sacrificed at the end of the experimental duration i.e. after 96 h and 30 days. The intestine was removed and washed in 0.70% saline solution, blotted with blotting paper and homogenised in 2 ml of 0.2M Phosphate buffer of PH 7.4 using homogenizer and homogenate, centrifuged at 8000 rpm for 30 minutes at 4°C and supernatant was taken in tubes for biochemical assay. All procedure was carried out in controlled cold conditions (Sawhney and Singh, 2000).

Amylase activity

Amylase activity was measured according to (Bernfield, 1955) using starch as substrate. The specific activity was expressed as mg Maltose/ gm protein/ hour.

Statistical analysis

The values were expressed as mean \pm SE (n = 5). A (P < 0.05) was considered as statistically significant.

RESULTS

For acute experiment

The results of the present investigation have been presented in (Fig. No.1& 2).

Variations in the amylase activity in the intestine of *Labeo rohita* exposed to Acephate toxicity for acute and chronic exposure. The maximum depletion percentage (-38.74%) shown in LC₅₀ group and (-58.01) in 1/10th group. The minimum depletion of percentage (-11.05) in LC₀ group and 1/20th group (-51.58). The activity of amylase was more significantly (P < 0.001) decrease in the intestine of fish exposed to lethal and sub lethal concentration of acephate. In the present study fishes exposed to the acephate and significantly changes of amylase activity in chronic exposure as compared to acute exposure.

DISCUSSION

In the present study, effect of acephate on the amyolytic activity in fish, *Labeo rohita* was observed. Acephate also acts on the functional activity of digestive enzymes and might be interfere with digestion. Pesticides create the stress and affected on behaviour, biochemical, in aquatic ecosystem.

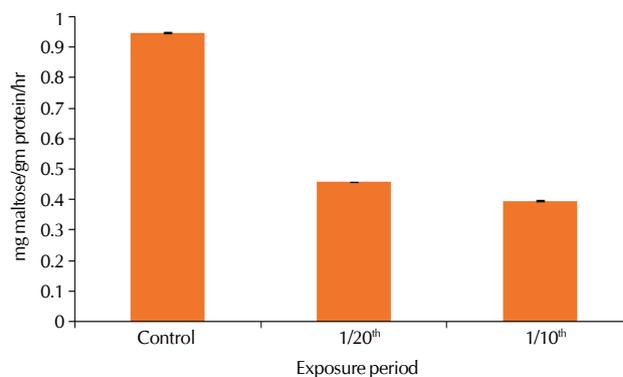


Figure 2: Amylase activity in intestine of *Labeo rohita* exposed to acephate for chronic exposure.

So, the reason for decrease in digestive enzyme, amylase activity more changed chronic study. Because of exposure period and the high concentration (LC₅₀ (3000ppm) and 1/10th (300ppm).

Many workers worked on the enzymes in the various animal species and various toxicants (Rao *et al.*, 1991; James and Soni, 1994; Kamble, 1999; Mahananda *et al.*, 2013). Izvekova and Solovye, (2012) observed the increased protease activity and decreased amylase activity from the intestinal segments of pike. Bhattacharya, *et al.* (1975) observed decreased of alpha amylase activity in *Clarius batrachus* when exposed to endrin. Choudhari and Lomte, 1992; Rani *et al.*, 2015, worked on amylase activity in different species during toxicity stress.

The inhibitions of amylase activity due to the toxicity of pesticides decreased or inhibit enzymatic activities or it may be related to hormonal level in the fish body. Stress might have suppressed the enzyme activities in the fish, in agreement in our findings (Murthy *et al.*, 1994; Kuzumina, 1996).

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