



EFFECT OF DIAZINON ON THE ACTIVITY OF ALKALINE PHOSPHATASE AND ACID PHOSPHATASE IN *CHANNA PUNCTATUS*

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Abstract

The impact of pesticide like Diazinon was localized histochemically on the activities of the alkaline phosphatase and acid phosphatase on stomach and intestine of *Channa punctatus*. It has been observed that the pesticide interfere with protein and lipid metabolism. Our experimental evidences may be useful in revealing the mechanism of injuries caused by this pesticide.

Key Words: Stomach, Intestine, Alkaline Phosphatase and Acid Phosphatase.

Introduction

The wide use of agricultural pesticides in discriminately has developed an ecological crisis due to environmental pollution. These pesticides residue are washed away by rain water into rivers. Most of the pesticides used have appreciably long life period and also quite stable. However, some of them undergo biodegradation on soil, water or in animals and plant bodies. Pesticides are highly toxic to the organism and poorly effected of organisms.

Fishes are the important part of aquatic biota. When pesticide enters in to the body of fishes, creates physiological as well as histochemical changes in the body of fishes. The outstanding characteristics feature of almost all the biochemical reaction is that the process involved is greatly accelerated through the mediation of natural biocatalyst called 'enzyme'. It is only due to the high degree of specificity and great efficiency of enzymes that direct the biochemical reactions takes place through define pathways. Enzymes are universally present in the all living cells and organism. The occurrence of metabolic reaction common to all cells, reflect the specificity of enzymes.

Very little work has done on effect of pesticide on enzyme's activities in different tissues of fish body. The present study has been designed to understand the changes in alkaline phosphatase and acid phosphatase in the stomach and intestine of *Channa punctatus* when treated with Diazinon.

Material and Methods

Live specimen of *Channa punctatus* were collected from local agencies and were acclimatized to laboratory condition for 7 days. The fishes were divided in to two groups with 20 fishes each. The first group was kept in Diazinon solution of 3.1 mg/l. The second group served as control and was maintained under laboratory condition in ordinary tap water. The treatment was applied on fishes for one month. After one month the fishes were sacrificed one by one by decapitation. The tissues (Stomach and intestine) were removed carefully and fixed in 10% neutral formalin (as a fixative). Paraffin sections were prepared and subjected to the following histochemical tests:

1. Gomori's revised method for alkaline phosphatase substrate medium pH=9.4⁹.
2. Gomori's revised method for acid phosphatase, substrate medium pH=5.0¹¹.



Results and Discussion

Alkaline Phosphatase

Stomach

In stomach of control fishes a very strong presence of alkaline phosphatase was observed in mucosa. A moderate presence is seen in muscular layer, submucosa and serosa. After Diazinon treatment poor activity was observed in mucosa and submucosa layers. Details are given in table 1.

Intestine:Control fishes showed a good presence for alkaline phosphatase throughout the tissue layer. After treatment of Diazinon no activity was observed in submucosa, muscular and serosa layer. A very feeble and dull activity could be noticed only in mucosa. Details are given in table 2.

Acid Phosphatase

Stomach :A strong positive activity was noticed in epithelial, gastric cells of mucosa and connective tissue of submucosa while muscularis layer and serosa showed dull activity. The treatment of Diazinon showed a poor reaction in gastric gland of submucosa. Other tissues gave no response. Detail observations are given table 3.

Intestine :The control fish showed a very strong positive reaction for acid phosphatase in mucosa and submucosa. After Diazinon treatment muscular layer and serosa showed a bad activity and poor presence for acid phosphatase. Details are given in table 4.

Acid phosphatase splits the monoesters of orthophosphoric acids in acidic medium with optimum pH being in between 3.0 to 3.5 from the biological stand point, the acid phosphatase have been classified as type II, III and IV^{21,22}. A surfactant when treated with lipid it dilutes other molecule of the solution, dilute molecules which have high attractive force of attractions and in this way lowers the surface tension at the interface. The surface tension reducing properties of surfactant are dependent mainly upon phospholipids^{4,10}. Thus, lipids mainly the phospholipid possess greatest physiological importance. Present histochemical study showed that the pesticide Diazinon has adverse effect on the lipid in gills and kidney^{16,17,18,19,20}. Nutritional etiology of fatty liver has been recorded⁵. Lipids after carbon tetra chloride poisoning on squirrel has been recorded¹³. Diazinon has ecological risk in agricultural use³. It has been recorded that Diazinon treated fish showed abnormal behavior which include restlessness, arena movements, loss of equilibrium, increased opercular activities, strong spasm, and paralysis¹². Diazinon has toxic effects on various organs on fresh water fish^{1,2,6,8,14,15}. Measurement of bioconcentration of pesticide by fresh water fish has been recorded⁷. Thus it may be concluded that our observations may be helpful to dispel doubts concerning the reliability of a pesticide exposure to the fishes.

Table 1. Distribution of alkaline phosphatase in the stomach of *Channa punctatus* after the treatment of Diazinon.

Treatment	Mucosa		Submucosa	Muscularis		Serosa
	Epithelial cells	Gastric glands		Circular muscle	Longitudinal muscle	
Control	+++	++	+	+	+	+
Diazinon	±	±	±	–	–	–



+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table 2. Distribution of alkaline phosphatase in the intestine of *Channa punctatus* after the treatment of Diazinon.

Treatment	Mucosa	Submucosa	Muscularis		Serosa
			Circular muscle	Longitudinal muscle	
Control	+++	++	+	+	+
Diazinon	□	□	–	–	–

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table 3. Distribution of Acid Phosphatase in the stomach of *Channa punctatus* after the treatment of Diazinon.

Treatment	Mucosa		Submucosa	Muscularis		Serosa
	Epithelial cells	Gastric glands		Circular muscle	Longitudinal muscle	
Control	++	++	++	±	±	±
Diazinon	+	±	±	–	–	–

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table4. Distribution Acid Phosphatase in the intestine of *Channa punctatus* after the treatment of Diazinon.

Treatment	Mucosa	Submucosa	Muscularis		Serosa
			Circular muscle	Longitudinal Muscle	
Control	+++	+++	+	+	++
Diazinon	□	□	–	–	□

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □, Nil Activity.



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