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# CHANGES IN THE PHOSPHORYLASE ENZYME ACTIVITY LEVELS IN THE TISSUES OF THE *BARYTELPHUSA GUERINI* (MILNE EDWARDS) DUE TO MONOCROTOPHOS STRESS

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The total phosphorylase and active phosphorylase enzyme activity in the muscle and hepatopancreas tissues of the *Barytelphusa guerini* considerably increased on exposure to monocrotophos pesticide, but the inactive form of phosphorylase activity not shown considerable change. The phosphorylase activity levels are restored to normal during recovery period.

## INTRODUCTION

The phosphorylase enzyme system occupies a strategic position in the glycolytic pathway. It is the initial catalytic force in the chain of chemical events leading to breakdown and utilization of glycogen (Statten & Statten 1960; Hohnke & Scheer 1970; Chang & O' Connor 1983). The enzyme exists in two forms as active form "a" and inactive form "b" and the total phosphorylase "a" and "h" represents the activities of both "a" and "b" (Cowgill, 1956).

Several investigators have studied the phosphorylase activity in crustacean tissues on exposure to different pesticides, *Metapenaeus monoceros* on exposure to phosphomidon (Srinivasulu Reddy, 1986; Srinivasulu Reddy & Raman Rao, 1988), *Oziotelphusa senex senex* exposed to lethal and sublethal concentrations of endosulfan (Rajendra Prased Naidu, 1985), *Barytelphusa guerini* on exposure to sublethal concentrations of endosulfan (Nagender Reddy, 1989).

Phosphorylase enzyme, it is being regulatory enzyme, it gives an insight into glycogen breakdown to be utilized for metabolic purposes, thus, in present investigation the estimation of phosphorylase enzyme activity has been undertaken in the tissues of the *Barytelphusa guerini* on monocrotophos pesticide exposure and also in recovery.

## MATERIALS AND METHODS

Freshwater crabs, *B. guerini* were collected from paddy fields in and around Gulbarga. They were acclimatized to the laboratory conditions at $25^0 \pm 0.5^0$ C for a week. They were fed with slices of frog muscles and water was changed daily, only healthy and active animals were selected for experimention.

Monocrotophos stock solution was prepared to get 1 mg/ml concentration, appropriate dilutions were made from the same. Equal Number of male and female crabs falling in the size range of 35 to 40 gm were used, in order to nullify the effect of size and sex on different responses.

Enough number of animals were taken and exposed to lethal concentration (2ppm) of monocrotophos pesticide, controls were used simultaneously. At the end of every 24 hr the muscle and hepatopancreas tissues were collected and the phosphorylase enzyme activity was estimated upto 96 hr. After 96 hr of pesticide exposure the exposed crabs were brought back to pesticide free medium and the estimations were made in the recovery period.

Phosphorylase activity was estimated by using the method Cori *et al.* (1955). The enzyme activity was determined in the direction of glycogen synthesis and the inorganic phosphate liberated was estimated using the method of Fiske & Subba Rao (1925). The enzyme activity was expressed as µg pi liberatedµ/gm. wet wt/hr.

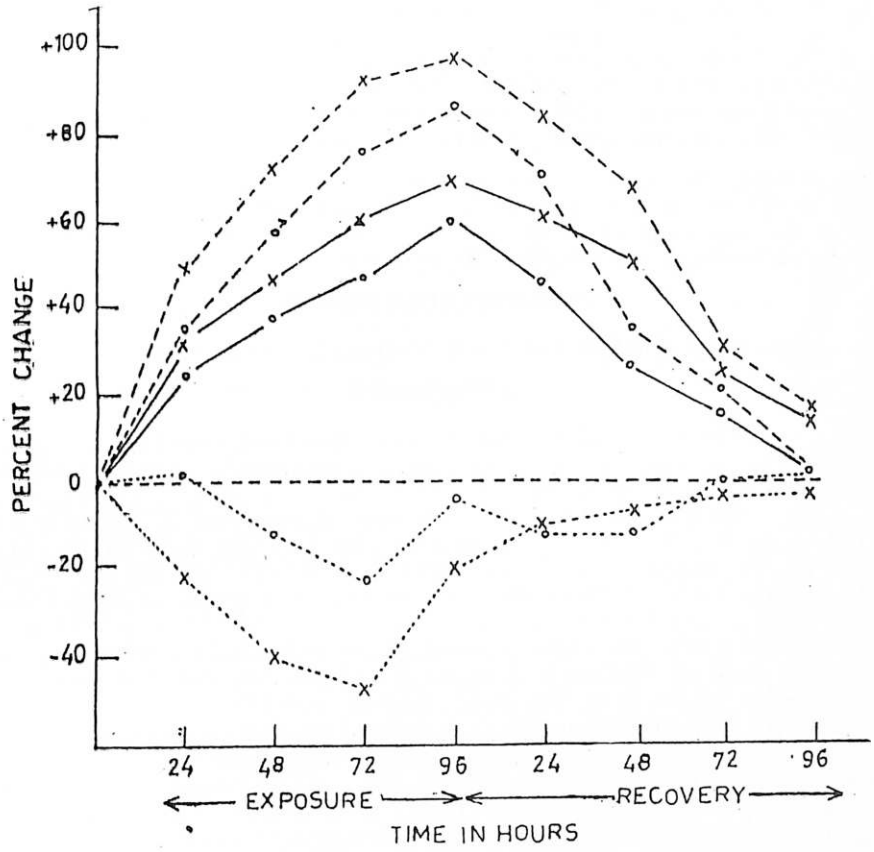


**Fig. 1.** Percent change in total phosphorylase (solid lines), active phosphorylase (broken lines) and inactive phosphorylase (dots) in muscle (open circle) and hepatopancreas (crosses) of crab on exposure to monocrotophos and during recovery at different time intervals.

## RESULTS AND DISCUSSION

The total phosphorylase activity (ab) in both the tissues, muscle and hepatopancreas showed a progressive increase with the pesticide exposure period. In the normal animals the enzyme activity of the muscle was 23.52 ± 2.52 µg of Pi/gm. wet wt/hr, in the hepatopancreas it was 12.50 ± 2.00. During the pesticide exposure period the activity increased significantly in all the periods. In the muscle the activity increased significantly ($P < 0.01$) 59.93% at the end of 96 hr exposure period. The activity was restored to near normal levels during recovery period. In the heptopancreas the activity of normal animals was 12.50 ± 2.00. The activity increased significantly ($P < 0.01$) 69.60% by 96 hr pesticide exposure period. The activity was restored to near normal levels by 96 hr of recovery period, the changes were not significant.

The active phosphorylase (a) activity of the muscle of the normal animals was 16.50 ± 1.21, it was increased progressively with pesticide exposure period. At the end of 96 hr pesticide exposure the activity increased significantly ($P < 0.01$) 86.78%. In the hepatopancreas of the normal animals the activity was 9.50 ± 1.80, increase was significant ($P < 0.001$) 97.89% by 96 hr pesticide exposure. In both the tissues the activities restored to near normal levels in the recovery period.

The inactive phosphorylase (b) activity of the normal animals was 7.02 ± 1.23 in the muscle and 3.00 ± 1.25 in the hepatopancreas. These activity levels did not show any significant change during any period of the pesticide exposure, hence during recovery period also (Fig.1).

It has been observed that the monocrotophos pesticide affects the metabolic system in the crab. Increased phosphorylase (a) activity under pesticide exposure may be due to the result of hormonal imbalance. It is known that pesticide administration leads to increased glucogon production which activates CAMP, thus facilitates the conversion of phosphorylase "b" to "a" (Kalicharan & Gibson, 1972). It is possible that monocrotophos might be acting at the level of the neuroendocrine system to induce CAMP formation through adenyl cyclase mediation.

The present results also supports the earlier observations with reference to different pesticides. Elevation of phosphorylase activity is observed in *Metapenaeus monoceros* on exposure to phosphomidon (Srinivasulu Reddy, 1986; Srinivasulu Reddy & Raman Rao, 1988), endosulfan exposure to *Barytelphusa guerini* (Nagender Reddy, 1989).

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