

CARDIAC PHYSIOLOGY OF FRESH WATER MALE CRAB, *BARYTELPHUSA GUERINI* UNDER SUMIDON AND ACEPHATE STRESS

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ABSTRACT

The fresh water male crab, *Barytelphusa guerini* was selected for experimentation. The crabs are available in the paddy fields of Nanded district. The animals were collected and brought to the laboratory for acclimatization. The animals were subjected to sub-lethal concentration on pesticide i.e. Sumidon and Acephate. The effect of Sumidon and Acephate on cardiac physiology of fresh water male crab was studied. For the toxicological studies, the animals were subjected to sub-lethal concentration of Sumidon (1.2 ppm) and Acephate (3.5 ppm) at 0, 24, 48, 72 and 96 hours after regular intervals. The animals were dissected and heart beats were recorded for 1 minute. The results reveal that due to toxic effects, the rate of heart beat decreases gradually with slight increase up to 96 hrs period of exposure. The results were Plotted and discussed in details.

Key Words: *Barytelphusa guerini*, Acephate, Sumidon, Heart Beat.

INTRODUCTION

The studies of impact of pesticides, organic and inorganic matter on aquatic animals are the important aspects of chemical contamination of environment. Many chemical pesticides such as organochlorine, carbamate, organophosphate, fungicides, herbicides etc. are useful in agriculture and equally important against pest that causes diseases of animals and human beings. Pesticides like Sumidon and Acephate are biologically active; they are extensively used in plant protection, operations on account of their less persistence in the environment their excessive use produces more hazards to the aquatic animals. The problem associated with presence Sumidon and Acephate insecticides stability; they are extremely persistent and widely distributed in the environment. These pesticides pose a critical stress on the aquatic biota, like crabs.

Water resources are said to be polluted due to human activity by changing the addition of matter to the water or altering the temperature, the physical, chemical or biological characteristics of the water are changed. Therefore its environmental value is demonstrably depreciated. The aquatic animals are susceptible to such various pollutants, but they have to adjust to these new circumstances by changing their metabolic activities.

Now a days many pesticides have been extensively used and are utilized in agricultural operation. These pesticides have various physiological effects such as enzyme Inhibition, inhibitory effects on growth, food intake, metabolism and general development of animal. The study of the impact of pesticides on aquatic animals is an important aspect of chemical contamination of the aquatic environment (12).

MATERIALS AND METHODS

The freshwater male crab, *Barytelphusa guerini* used for experimentation. The species is available abundantly in the paddy fields of Nanded district, Maharashtra. The crabs were maintained in the glass aquarium jars, fed with goat meat and acclimatized to the laboratory conditions. The freshwater male crabs, *Barytelphusa guerini* (weighing between 35 to 50 gms) were subjected to one sub-lethal concentration of 1.2 ppm of Sumidon and sub-lethal concentration of 3.5 ppm of Acephate up to 96 hours period of exposure. Only healthy crabs were selected for the present study (1).

The animals under submerged state were exposed to sub-lethal concentration of Sumidon and Acephate and rate of heart beat was studied at the intervals of 0, 24, 48, 72 and 96 hr. The fresh water ale crab, *Barytelphusa guerini* were cut through the lateral side and the dorsal carapace was removed carefully to expose the heart. The animal was kept in bowl filled with crab ringer and maintained for 10 minutes to allow the recovery from shock effects and stabilization of heart rate. The numbers of heart beats were counted in 1 minute. The same procedure was repeated for six readings under each observation.

RESULTS

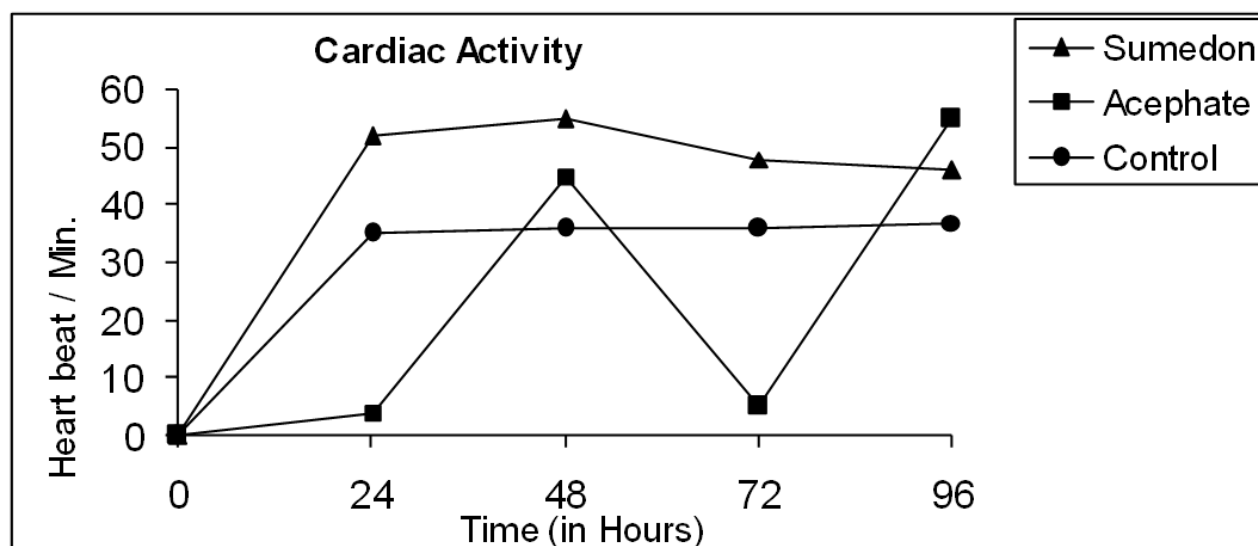
The heart rate exhibited differential effects on exposure to two commonly used pesticides i.e. Sumidon and Acephate. The heart rate accelerated due to the exposure to Sumidon and Acephate concentrations as compared to control animals. The values obtained for 24, 48, 72 and 96 hours period of exposure were found to be 52, 55, 48 and 46 respectively. On exposure to Sumidon concentration the animals exhibited accelerating effect on heart rate. The activity of cardiac rhythm was minimum at 24 hours, but there were sudden increase in heart rate up to 24 hours but as exposure time of toxic material increased up to 96 hours the rate of heartbeat progressively decreased, it showed decrease from 72 hours up to 96 hours.

Table Showing the Cardiac Activity on Exposure to Sumidon and Acephate

Time (hours)	Sumidon	Acephate	Control
0	--	--	--
24	52	40	35
48	55	45	36
72	48	50	36
96	46	55	37

The treatment of Acephate treated animal showed a gradual increase in the rate of heart beat of crabs from 24 hours up to 96 hours respectively.

Figure-1: The cardiac activity of Carb, *Barytelphusa guerini* on exposure to Sumidon and Acephate



The obtained values up to 96 hours period of exposure were found to be 40, 45, 50 and 55 respectively.

The heart rate exhibited differential effects on exposure to pesticides i.e. Sumidon and Acephate. In control animals the rate of heart beat gradually increased up to 96 hrs. The obtained values were as follows 35, 36, 36 and 37 for 24, 48, 72 and 96 period of exposure.

DISCUSSION

The available literature reveals that the heart rate in crustaceans influenced by a number of factors like body size, activity, respiration, stress, light, blood, moulting, diurnal cycle, PH ect. (7, 9). The heart beat frequency has been studied with a conclusion that alterations in heart rate occurs readily with change in environment and have an impact upon heart rate of aquatic crab (4, 5, 2 & 3).

The number of pollutants affects on cardiac activity of fresh water crab, *Barytelphusa guerini* (10). Impact of Inorganic Pollutants on rate of heart beat in male crab, *Barytelphusa guerini* (6 & 8). Therefore physiological modulations in cardiac rhythms of crab *Barytelphusa Cunicularis* induced by pollutants (11).

Depletion in the rate of oxygen consumption upon exposure to heavy metal stress weight be due to a penetration of the pollutants at sub-cellular levels and damage of gill tissue, thereby failure of an alternative compensatory mechanism to achieve energy generation for combating toxic stress. Present study was under taken to study the effect of pesticides i.e. Sumidon and Acephate on cardiac physiology of crab (male), *Barytelphusa guerini*. The obtained results clearly indicates that the effects of pesticides i.e. Sumidon and Acephate initially inhibit the heart rate which indicates animal try to settle-down into the toxic medium but later on the effects of toxicants accelerate the metabolic activity of the animals which accelerate the rate of heart beat in a crab after this treatment.

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