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HISTOCHEMICAL CHANGES IN THE GILLS OF THE FRESHWATER CRAB, BARYTELPHUSA CUNICULARIS (WESTWOOD): EXPOSED TO MALATHION

Zoology

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ABSTRACT

The terrestrial crab plays relevance modal in the study of population and also beneficial for human activities. As the crabs are abundantly available locally and used as diet for some people with great nutritive value, there is a potential to project it as poor man's protein. The present study deals with the histopathological changes in the freshwater crab *Barytelphusa cunicularis.* Live specimens of *Barytelphusa cunicularis* were collected from local wet areas of Maroda sector-Bhilai, (C.G). Average weight of crabs varies from (45-50gms), the carapace length and carapace width varies from 3.20-4.50mm and 4.25-5.80mm respectively. The crabs were acclimatized in the laboratory condition, and kept in two groups the control group set free from Malathion and the experimental group was exposed to malathion for LC_{50} at different concentration 0.45ppm, 0.30ppm, 0.26ppm and 0.25ppm for 24hrs, 48hrs, 72hrs and 96hrs respectively. The gills were dissected from both the control and experimental crabs and the sections of 5µm thick were cut, processed and stained with heamatoxylin and eosin. They were examined and studied under Olympus light microscopy by a built in camera. The histopathological changes suggest that there is thickening of gill lamella, rupture of capillaries, hyperplasia of epithelial cells were also seen, which leads to the fusion of gill lamella. This indicates that the Crabs play a significant modal in the aquatic environment and also good indicator for polluted condition.

KEYWORDS

Freshwater crab, Histopathalogy, Malathion, gills, Pesticide.

INTRODUCTION

Crabs are particularly useful in aquatic environment studies for several reasons and play important role in ecosystem processes and good indicator for polluted condition. The crabs, shrimps, shall fishes have good concentration of protein since, it protect against heart diseases. Crabs are highly social animal & rich behavioral aspects. They communicate by visual and vibral signals. Land crabs present a useful modal for the evolution of territoriality showing some anatomical changes which can result in morphological and physiological function. The terrestrial crab play a significant modal in the study of population and also beneficial for human activities. As the crabs are abundantly available locally and used as diet for some people with great nutritive value, there is a potential to project it as **Poor man's protein**. The wide spread used of chlorinated pesticides of control pest species creates ecological disturbance which in term affect the non target organisms. Recently **Diwan and Sutar** studies the reproductive system of *B.cunicularis* in 1971 & 2002 respectively. These days pollution of the environment by pesticides is a great problem.

Pesticides may modify the normal functioning of human and wildlife endocrine system. Pesticides constitute of the major agriculture chemical groups which though play an important role in agriculture productivity but have posed potential hazard to non target species. Histopathological studies have been useful in evaluating such effect of an organism. Since, the trace amounts of their chemical which don't bring mortality over a period are capable of producing considerable organ damage. Analysis of histopathological changes in target organ provides a valuable tool in understanding the role of specific cells & organ.

Malathion is one such widely used organophosphate pesticide. Widely used in agriculture and houses for the control of disease vectors. It is major source of experimental poisoning in the developing countries. Once Malathion is introduced in the environment, usually from spraying on crop or in wide urbon or residential areas, droplets of Malathion in the air fall on soil, plants, water or man –made surfaces. Malathion breaks down quickly by the action of water and bacteria present in it. After reacting with other chemicals formed naturally in the air they broke down in to more toxic substance called Malaxon, **Magar and bias (2013).** Once the Malathion is introduced into the environment it may causes serious intimation to aquatic organisms and is notorious to causes severe metabolic disturbance in non target species like crabs, fishes and other aquatic animals like fresh water mussels etc. **Pugazhvendan et al. (2009)** exposed *ophiocephalus punctatus* for 7 days to Malathion and different concentrations and reported severe histochemical changes in brain, liver, ovary and tissues. **Frank et al. (1990)** reported contamination of form wells by the various pesticides including Malathion.

Histopathological studies in the gills of aquatic organism provide useful data about effect of different chemical & pesticides on particular organism. It is very simple and common tool for determining the effect of various toxic substances in animal body. Pollution makes our environment more & more virulent. When the relation between the element of nature like air and water are disturbed, ecological balance is harmed. Our environment is polluted by different types of pollution Including water pollution, air pollution, sound pollution, soil pollution etc. Water pollution is one of those which concern with the undesirable changes in medium which effect hardly to aquatics as well as terrestrial body. Industrialization in the modern civilization spread water & air pollution simultaneously & it appears to be a very dangerous condition. If it is not controlled today then all the living things of the earth will be destroyed in near future. Sewage waste, agriculture waste, industrial effluents etc. are various means by which water get polluted.

Aquatic medium is highly contaminated with heavy metal that's all are release from industries, man-made activity by different process. Pollution decreases the floral & fauna diversity on earth. Majority of animals sensitive towards change in the chemical as well as parametric quantity of aquatic medium. In animal kingdom arthropods have largest diversity they are much susceptible towards contamination with water pollutants. According to **Burggren & McMahon in 1988**, crab has always been taken into consideration for various reasons such as environmental pollution, remedial traits & tourist attraction. Biochemical constitutes like glycogen, protein and lipids are considered as sensitive indicators of pollution effect in crabs. It is of prime importance to understanding biochemical changes in organism under the stress of pollutants **(Kharat. et al. 2009) & (Wen, X.I. Chen, et al. 2006).** A good amount of information in toxicities of pesticides pollution on aquatic animals are available by **(Dalela et al. 1979), Dubale & Shah (1984), Pandey & Shukla (1980), Rashatwar & Llays (1984), Das et al. (2013), Deka & Mahanta (2012).**

Since, there is practically no information regarding the effect of Malathion on the gills of the fresh water crab, the present investigation is being proposed was to determine the histochemical changes in the gills of fresh water crab ,*B.cunicularis* after expose with Malathion.

MATERIALS AND METHODS

Live specimens *of Barytelphusa cunicularis* was collected from local

wet areas, fresh water ponds and garden area of **Kalyan P.G. College Bhilai (Chhattisgarh).** Healthy and various size of crabs with weight 25- 40 gms, and measurement carapace length 2.8- 3.5 mm. and carapaces width 4-5.8 mm were taken in aquarium and fed with wheat grains. They were acclimatized for 6 days in the laboratory condition before the commencement of experiments.

For the experiment, the specimens were kept in two experimental groups, control group and experimental group. Control group were kept free from exposure to Malathion and experimental group was exposed to Malathion. At the end of the exposure period, the gills were dissected from both control and experimental crabs. Gills were dehydrated in different grades of alcohol then Paraffin blocks were prepared. By the help of microtome machine 5µm thick paraffin section were cut and they were taken for histological examination. Stained slides of both control and experimental crabs were studied and compared by using microscope and were photographed (10x,40x,100x).

fig; External morphology Male & Female crab ,*Barytelphusa cunicularis*

fig; Gills of Barytelphusa cunicularis

RESULT AND DISCUSSION

MORPHOLOGY OF GILLS

Gills are located in gill chamber in the antero- ventral region of thoracic region. The color of the gills varies from brown to deep brown. Gills are paired and have crescent shape structure and located laterally on either side of alimentary canal and hepatopancreas.

HISTOLOGICAL STRUCTURE OF THE GILLS IN CONTROL CRAB-

Gills are located in gill chamber in the antero- ventral region of thoracic region. Gills are light brown in colour. Gills are paired and have crescent shape structure and located laterally on either side of alimentary canal and hepatopancreas. Histological structures of the Gills in the control crabs are phyllobrachiate type consist of central stem (axis, raphe) which bears paired plate or lamellae. The central axis has afferent and efferent haemal channels on each end with three types of cells, Connective tissue cell located in the gills stem, Branched arthrocytes located in the stem and proximal lamellae, Lamellae cells are located in the epithelium. The Gill epithelium stained deep pink in haematoxylin and eosin.

HISTOLOGICAL STRUCTURE OF THE GILLS IN EXPERIMENTAL CRAB-

After exposure of malathion on different concentration such as 0.45ppm, 0.30ppm, 0.26ppm and 0.25ppm.The Lc50 values for 24 hours, 48 hours, 72hours and 96hours respectively of malathion. The gills lamellae ruptured connective tissue cell in the stem damaged. Destruction of haemocytes in gill lamella, vacuolization in the gill stem. The connective fluid band present in between the two gill lamellae is found to be ruptured. The experimental crab expose to lethal concentration of copper sulphate exhibit, histological changes in the gills, by **Atul et. al (2013). Li et.al (2007)** found structurally changes including the swelling and fusion of the lamellae, abnormal gill tips and necrotic lamellae in gills of fresh water prawn, *Macrobrachium rosenbergii* exposed to waterborne copper.

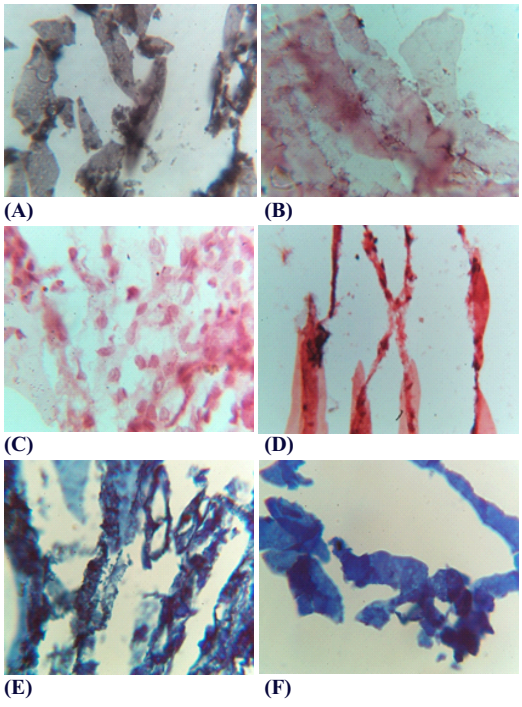

Fig:- control (A) Glycogen (C) Lipid (E) Protein
Experimental (B) Glycogen (D) Lipid (F) Protein

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