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Short Communication

Histopathological Impact of Malathion on the Ovary of the Fresh Water fish *Channa punctatus*

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Abstract

The histopathological effects of sublethal concentration of malathion in the ovary fresh water teleost, Channa punctatus were investigated. An exposure dependent alteration in ovary and histology is reported for both acute and chronic exposures were reported in Channa punctatus. In acute exposure (for 4 days) reduction in size of mature oocytes, disruption, vaccualation in cytoplasm were reported. In chronic exposure (for 15 days) complete loss of normal configuration of ovary, necrosis, elongated ovarian follicles, and fragmented ova with abnormal shape were reported.

Keywords: Histopathology, Oocyte, *Channa pucntatus,* Malathion, Sublethal.

Introduction

Pollution has now become at par with the conventional crimes. As water is scarce and its demand is likely to increase further, it needs more attention. Everybody knows that pollution refers to the contamination of the environment with harmful and undesirable wastes. One of the major agricultural chemical groups is pesticide which play important role in increasing agricultural productivity through controlling pest. But on the other hand, they cause much damage to the non-target organisms both in terrestrial and aquatic environment. Pesticides are the chemicals, which have posed potential health hazard not only to livestock and wild life but also to fish, birds, mammals and even human beings.

Aquatic organisms, including fish, accumulate pollutants directly from contaminated water and indirectly via food chain[1]. The aquatic environment is continuously being contaminated with toxic chemicals from industrial, agricultural and domestic activities. In India pesticides are one of the major classes of toxic substances for management of pest in agricultural sectors and control of insect vectors of human disease. The runoff from treated areas enters the river and aquaculture ponds that are supplied by rivers. Water pollution due to pesticide is posing intricate problems that need our immediate attention. New chemical formulations are widely used to control pests of agricultural crops. Overspray and runoff of pesticides from agricultural fields may easily find their way into the natural water surfaces and adversely affect the quality of water surfaces and creates hazards for aquatic life resulting in serious damage to non-target species, including fishes[2].

Histopathology deals with the study of pathological changes induced in the microscopically structure of body tissue. Any alteration in normal structure of tissue indicates presence of disease or the effect of toxic substances like heavy metal and pesticides. Sprague J.B.[3] described histopathology as important tool for evaluating the action of any toxicant at tissue level. Histopathology provides data concerning tissue damage. Histopathological alterations can be used as indicators for the effect of various anthropogenic pollutants on organisms and are a reflection of overall health of the entire population in the ecosystem. These histopathological biomarkers are closely related to the other biomarkers of stress since many pollutants have to undergo metabolic activation in order to be able to provoke cellular change in the affected organism[4].

Malathion is an organophosphorus insecticide widely used in agriculture and houses for the control of disease vectors. It is a major source of environmental poisoning in the developing countries[5]. Once malathion is introduced into the environment, usually from spraying on crops or in wide urban or residential areas, droplets of malathion in the air fall on soil, plants, water or man-made surfaces. While most of the malathion will stay in the areas where it is applied, some can move to areas way from where it was applied by rain, fog and wind. In water, malathion breaks down quickly by the action of water and bacteria in the water. Malathion is broken down in air by reacting with other chemicals formed naturally in the air by sunlight to form a more toxic product called malaxon[6]. Once malathion is introduced into the environment it may cause serious intimidation to aquatic organisms and it notorious to cause severe metabolic disturbances in non target species like fish and fresh water mussel[7]. The present study was undertaken to investigate the detailed histopathological

changes induced in ovary of *Channa punctatus* exposed to sublethal concentration of malathion for short term (4 days) and long term (15 days) periods.

Material and Methods

Healthy adult fish *Channa punctatus* were collected from local river Godavari Dist. Nanded. Fishes were washed with 0.1% of potassium permagnate ($KmNo_4$) solution to avoid dermal infection. They were then rinsed in water and acclimatized to the laboratory conditions for two weeks in 100L capacity glass aquaria. If mortality occurred during this period, dead fish were removed immediately with the fear that such mortality may deplete dissolved oxygen with resultant effect on other fish. During acclimatization fishes were fed with pieces of live earthworm on alternate days. Water in the aquaria was also changed once in every day.

LC_{50} of malathion for 96 hours was determined by probit analysis method[8]. The LC_{50} value of malathion for 96 hours was 4ppm. For studying histopathology of the various tissues, 10 fishes from treated groups were exposed to sublethal concentration of malathion (i.e. 0.8 ppm) up to 4 days and 15 days. Control group were also maintained separately. After 4 days and 15 days fishes were removed from both group and immediately stunned with a blow on the head body ovaries were dissected out and fixed for 24 hr in aqueous Bouin's fixative. Material was thoroughly washed in running tap water till yellow color of picric acid went off. The material was then dehydrated in different grades of alcohol, cleaned in xylene and paraffin blocks were prepared. Paraffin sections cut at 6 µm thicknesses with help of microtome machine. Ribbon of sections was taken on slides and excessive wax was removed by heating slide on lamp. Sections were stained with hematoxyline and Eosin and mounted in DPX. Stained sections of all tissues were observed under microscope and photographed.

Results and Discussion

Fish exposed to sublethal concentration of malathion during 4 days and 15 days shown considerable degree of alteration in the ovary. In acute exposure (for 4 days) reduction in size of mature oocytes along with vacuolation of cytoplasm were observed figure - 2. In chronic exposure (for 15 days) complete loss of normal configuration of ovary, necrosis, elongated ovarian follicles, and fragmented ova with abnormal shape were reported figure-3.

Many authors suggested effect of pesticide on ovary. In present study malathion affected normal structure of ovary and showed many structural and degenerative changes. Similar observations were made by Kulshrestha S.K. et al[9]. According to the Hazarika R. et al.[10] suggested toxicological impact of BHC on ovary of air breathing cat fish *Heteropneustes fossilis*. They showed many structural changes in ovary of fish during 1ppm, 5ppm and 10ppm. BHC dose alter normal ovary structure of *Heteropneustes fossilis.* Dutta K.K. et al.[11] and Nigam S.K. et al[12] reported degenerative changes in seminiferous tubules, enlarged interstitium and hemorrhage in intertubular area in albino rats exposed to pesticides. Shivarajah K. et al.[13] reported fragmentation and karyolysis of ova when *Salmo gairdneri* and *Cyprinus carpio* were exposed to aroclor 12.54. Similar observations were reported by Pandey A.K. et al[14], Pandey A.K. et al[15], Singh S. et al.[16] and Giri A.N.[17] working on insecticide basathrin induced histoanatomical insult of ovarian tissue of Indian catfish, *Heteropneustes fossilis* and reported the effects of insecticide basathrin induced histoanatomical insult of ovarian tissue of catfish. *H. fossilis.* They reported marked damage in germinal epithelium, atresia of oocyte, stromal hemorrhage, vacuolization of oocytes and general inflammation. Srivastava R.K. et al[18] reported Devicyprin induced many gonadal impairmante in a fresh water food fish *Channa punctatus* (Bloch).

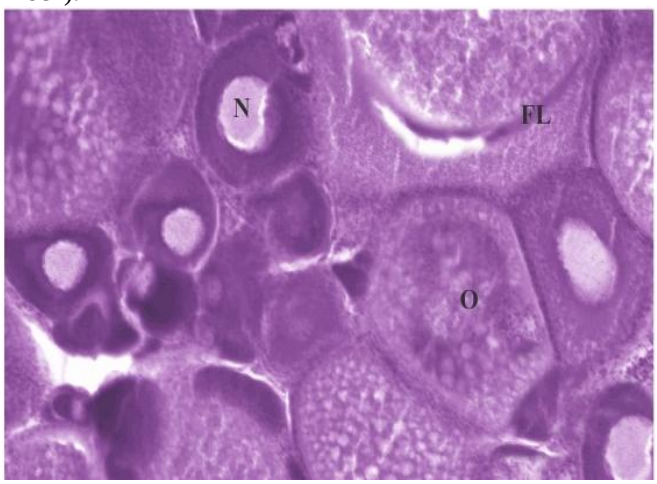
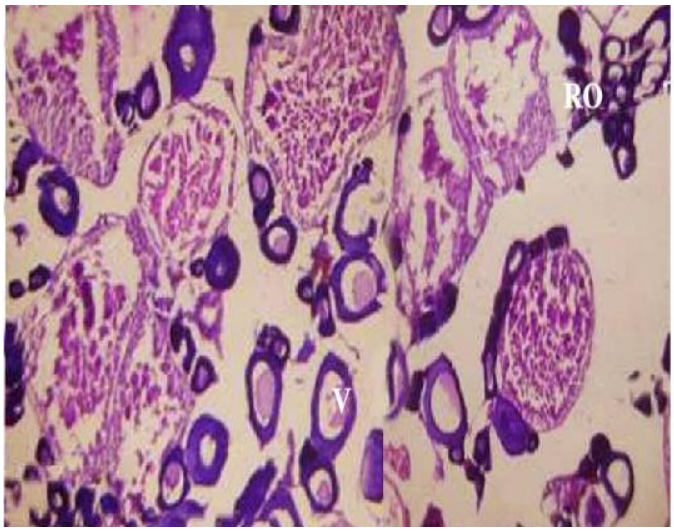


Figure-1
Overy of control fish *channa punctaus* N- Nuclus, O- Oocyte, FI- Follicular lining



Figue-2
Overy of treated fish *Channa punctaus* with sublethal concentration(0.8 ppm) for 4days , RO- Reduced oocyte, V- Vacuolation

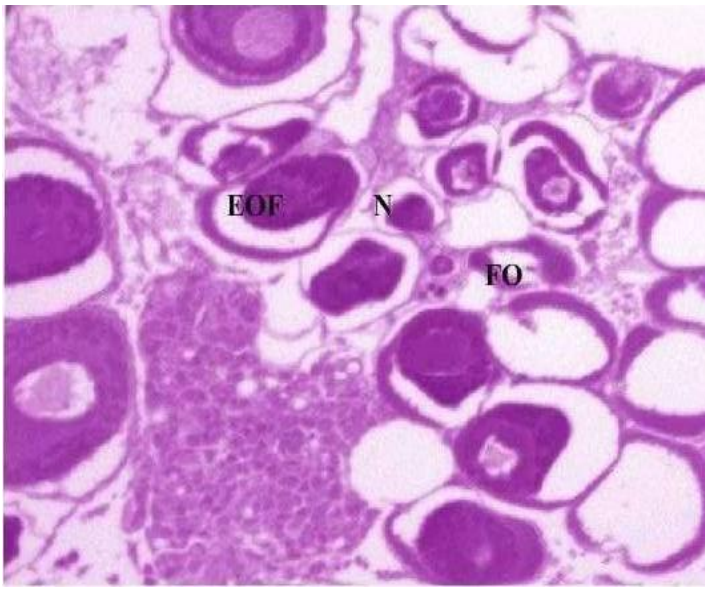


Figure-3
Ovary of treated fish Channa Punctatus with sublethal concentration (0.8ppm) for 15 days, FO- Fragmented ova, N- Necrosis, EOF- Elongated ovarian follicles

Conclusion

In the present investigation histpathological impact of malathion on the overy of fresh water fish *Channa punctatus* shows the gonadotoxic impact of malathion induced deleterious on ovarian histology of *Channa punctatus* which showed effect of pesticide on fertility and productivity of fresh water fish. considerable degree of alteration in the ovary, reduction in size of mature oocytes along with vacuolation of cytoplasm were observed. In chronic exposure complete loss of normal configuration of ovary, necrosis, elongated ovarian follicles, and fragmented ova with abnormal shape.

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