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# EFFECT OF MALATHION ON THE HISTOLOGY OF KIDNEY OF HETEROPNEUSTES FOSSILS

[1]RAMESH CHANDRA & [2]DHERMENDRA
[1]Dept.of Zoology, Swami Shukdevanand College, Shahjahanpur
[2] Dept. of Zoology, GUM, Baheri, Bareilly
rameshraj379@gmail.com

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## ABSTRACT

In recent years it has become a normal practice to test all new chemicals for toxicity before they could reach consumers. The major purpose of the toxicological investigations is to provide a basis for estimating the maximum dose that may be tolerated by animals throughout their lifetime without manifesting any adverse effects In the present study, shrinker tubules were found in malathion-treated kidney and dilated nuclei of tubules were seen in malathion treatment. Again, chlorpyrifos resulted in the elongation of renal tubules.

**KEY WORDS:** Malathion, Histology, Kidney, Heteropnuestus fossils

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## INTRODUCTION

The toxicity study is essential to find out toxicants' limits and safe concentrations so that there will be minimum harm to aquatic fauna soon. The toxicity determination of substances at the lower level of the food chain has been useful and accepted for water quality management. Unconscious and reckless handling of chemicals resulted in several disastrous pollutions and accidental poisoning incidences. Hence man has recognized the need for better control of the present use and future development of chemicals. In recent years it has become a normal practice to test all new chemicals for toxicity before they could reach consumers. The major purpose of toxicological investigations is to provide a basis for estimating the

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maximum dose that may be tolerated by animals throughout their lifetime without manifesting any adverse effects (Gralla, 1981).

Fishes are very sensitive to the changes in their aquatic environment. For this reason, they are known as the bio used amidst various groups of pesticides in intensive ag for various pests and diseases owing to their high insecticidal property, low mammalian toxicity, low persistence, and rapid biodegradability in the ecosystem. Pesticide exposure may also be fatal to many non-target or occasionally lead to the death of the fish. organophosphate insecticides are being extensively used as a dust, emulsion, and vapor variety of insect pests under different conditions. pesticides may induce many significant changes in fish. The present study is aimed to review the toxicological effects on hematological parameter behavioral changes, neurotoxic, histopathological alterations, respiratory responses, bioaccumulation, and chromosomal changes in fishes exposed to the organophosphate pesticide Malathion.

Malathion is the earliest, non-systemic, wide-spectrum organophosphate insecticide. Malathion may also be found in formulations with many other pesticides. However, Malathion is found to be highly toxic to various non-targeted aquatic organisms including fish. Histopathological effects of pesticides in fish have been studied intensively. Pathological changes occur mainly in the liver, blood vessels, kidneys, and gills. Liver cells exhibit cytoplasmic granularity, partial loss of liver plate radial orientation, and shrinkage of some liver cell mass. Glomeruli in the posterior kidney show pycnotic changes of cell nuclei, vocalization of cytoplasm, and atrophy of some cells. Gill filaments and lamellae show the precipitated masses that have plugged the central capillaries. Acute toxicity caused by different toxicants on freshwater fish can evaluate by quantitative parameters like survival and mortality of test animals and sensitivity of different fish species against metal’s toxicity (Kausar and Javed, 2012, Azmat *et al*., 2012, Ebrahimpoure *et al.,* 2010). Thus, the histopathological alterations in the kidney of freshwater fish *H. fossilis.*

**MATERIALS AND METHODS:**

The present study is intended to investigate the toxicity of Malathion on the Histopathological aspects of freshwater, air-breathing, catfish, *Heteropneustes fossilis.*

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The experimental design was based on Static Renewal Test (SRT), Range Finding, and Definitive Test (Acute Toxicity Test) described by Sprague22 and USEPA23. For each bioassay test, a series of three test concentrations of Malathion and a control were used.

The tissue samples were taken from the fishes exposed to the first three concentrations only. At the end of the experiment (60 days), live fish samples were collected from the above-mentioned three concentrations, sacrificed and their kidney was excised out, they were subsequently washed in distilled water and processed through graded series of alcohol, cleared in xylene, and embedded in paraffin wax. Sections of 10-micron thickness were cut; stained with Harris hematoxylin and eosin and mounted in DPX. Stained sections were examined with a light microscope for histopathological changes and, light photo-micrographs were taken.

## RESULTS AND DISCUSSION:

### Normal histology of kidney

### Control Group

Kidney tubules and hematopoietic cells were ordinary and deliberately organized inside the control treatment for the entirety of the control fish species. Control bunch indicating conservative renal mass and renal tubules. Showing conventional and deliberately sorted out kidney tubules and hematopoietic cells. The typical renal cortex comprises glomeruli, various vessels, tubules, and interstitium. Typically, all the glomerular vessels have the equivalent thickness, which might be exceptionally slender (practically wispy). With regular cellularity, cell cores aren't grouped or covered. In the cortex anyway, not the medulla, the tubules are nearly come back to once more, i.e. The rounded cellar films almost contacting. There could be almost no interstitium in the cortex. Interior supply routes have practically zero intimae, i.e. there might be next to zero space between the endothelium and the muscularis (Fig.1).

### Experimental group

**Histopathological changes created by Malathion (25mg/L) in *Heteropneustes fossilis*.**

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Sores in the kidney tissues of fish presented to Malathion were described by methods for degeneration inside the epithelial cells of renal tubule changes seen following 15 days of introduction to Malathion (25 mg/L) (Fig.2).

Pycnotic cores inside the hematopoietic tissue, expansion of glomerular vessels, degeneration of glomerulus, intracytoplasmatic vacuoles in epithelial cells of renal tubules with hypertrophied cells, and narrowing of the rounded lumen seen following 30 days of introduction to Malathion (25 mg/L) (Fig.3).

Exploratory establishment following 60 days of exposure to Malathion (25 mg/L) showed broken down renal tubules and cracked vein and pyknosis; demonstrating harmed blood slender and blood venturing into the tissue; cells (lymphoid tissues) show putrefaction and numerous phones show apoptosis (Fig.4).

**Histopathological changes delivered by methods for Malathion (50mg/L) in *Heteropneustes fossilis*.**

Trial bunch showing crumbled renal tubules and rot of cells after 15 days of exposure to (50 mg/L) Malathion (Fig.5). Test organization following 30 days of introduction to Malathion (50 mg/L) indicating huge territory among tubules and tissue, gotten littler glomerulus with huge Bowman's space, Enlarged lumen and Glomerulus, crumbled renal tubules, big space among tubules and tissue, contracted glomerulus (Fig.6). Following 60 days of presentation to Malathion (50 mg/L)displaying degeneration of kidney tubules and hematopoietic cells, corruption, pyknosis and drain (Fig.7).

**Histopathological changes produced through Malathion (75 mg/L) *Heteropneustes fossilis*.**

In multi day-dealt with the kidney, degeneration of kidney tubules and hematopoietic cells, rot, pyknosis, and drain had been moreover recorded at the portion of 75 mg/l for the fish species (Fig.8). Kidney indicating combination optional lamellae, swollen chloride cells, and gentle vacuolation after exposure of Malathion 75mg/L for 30 days (Fig.9). The expanding inside the length of urinary tubules that saw in this glance at alludes to hydropic growing.

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After exposure to Malathion 75mg/L for 60 days Kidney showed combination of auxiliary lamellae, swollen chloride cells, and slight vacuolation. This modification can be perceived through the hypertrophy of the cells and the nearness of little granules inside the cytoplasm, which assumes the appearance of a net. This underlying stage inside the degeneration procedure can improvement to hyaline degeneration, portrayed through the nearness of large eosinophilic granules inside the cells (Fig.10).

Considerable interest has been shown in recent years in the histopathological study while conducting sublethal tests in fish. In the present study, the sublethal concentration of three pesticides- malathion, chlorpyrifos, and fenvalerate resulted in several pathological alterations in the kidney of *Heteropneustes fossilis*. Degeneration of tubules especially distal convoluted tubules was visible in malathion treatment.

Degenerating tubules were also reported in the kidney of *Heteropneustes fossilis* exposed to different polluted river water. Likewise, the degeneration of cells of tubules was also observed by Ahmad *et al.*(2011) in the kidney of *Clarias batrachus* after cadmium chloride exposure. In this study, after treatment with pesticides, some sections of the kidney showed enlargement of the glomerulus. As the glomerulus became enlarged the space between the glomerulus and Bowman's capsule decreased. Again, in some sections of the malathion-treated kidney shrinkage of the glomerulus occurred which in turn increased the space between the Bowman's capsule and glomerulus. Shrinkage of glomerulus was reported by many authors like Muthukumaravel *et al.* (2013b) in monocrotophos-treated Labeo *rohita*; Singh (2012) in dimethoate-treated *Cyprinus carpio* and Haque *et al.* (2012) in fluoride-treated *Channa punctatus.*

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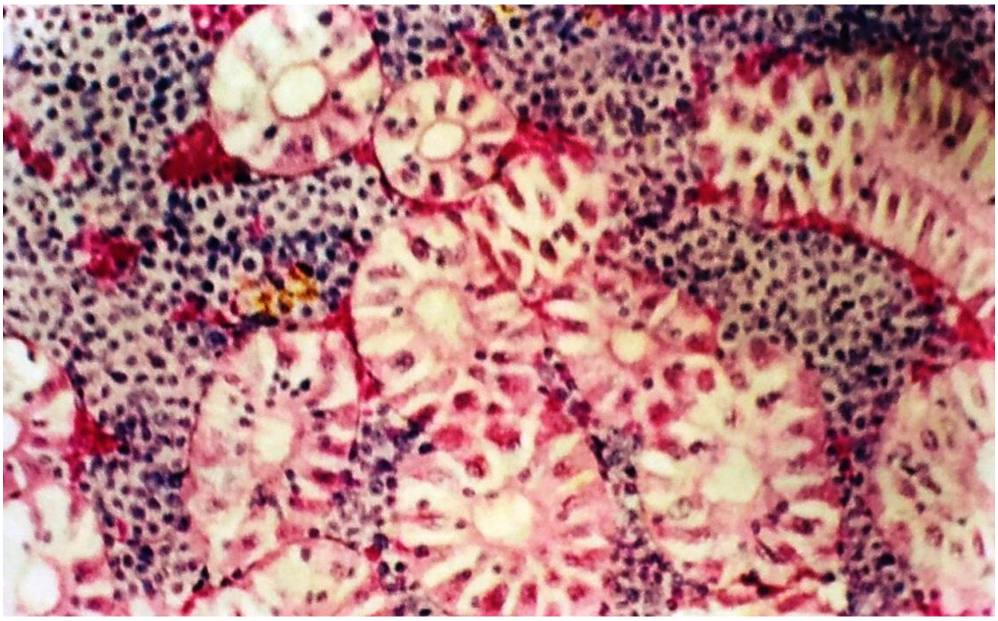

Fig. 1- Normal structure of kidney of *Heterpnuestes fossillis* showing renal tubule and haemopoietic tissue

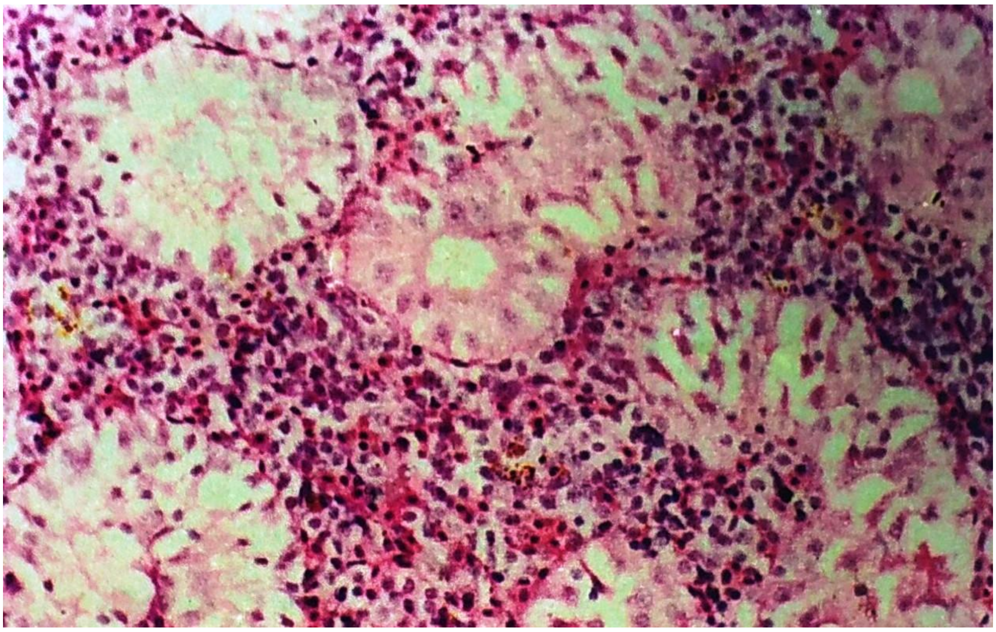

Fig.2-Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 25 mg/L for 15 days.



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Fig.3 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 25 mg/L for 30 days.

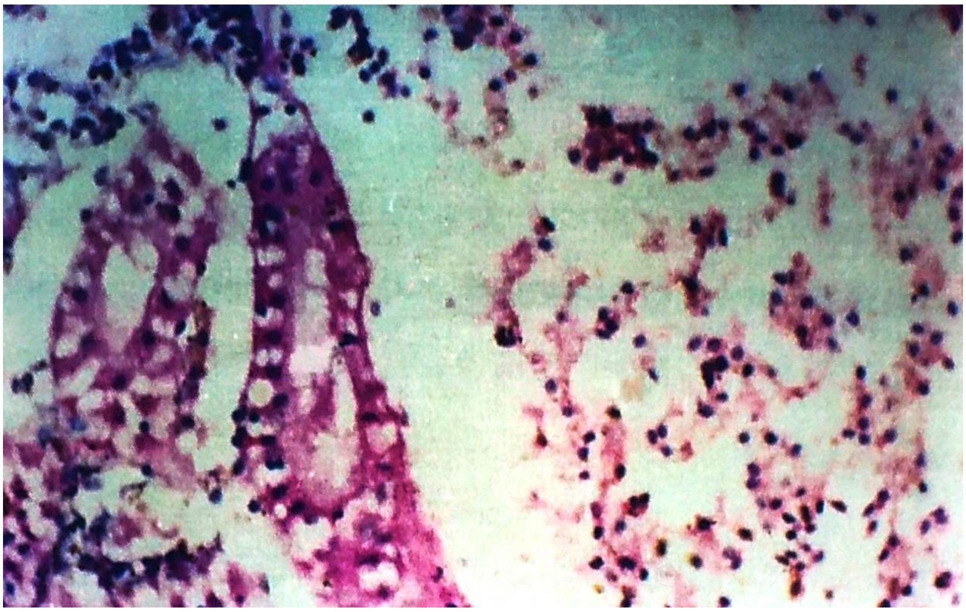

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Fig.4 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 25 mg/L for 60 days.

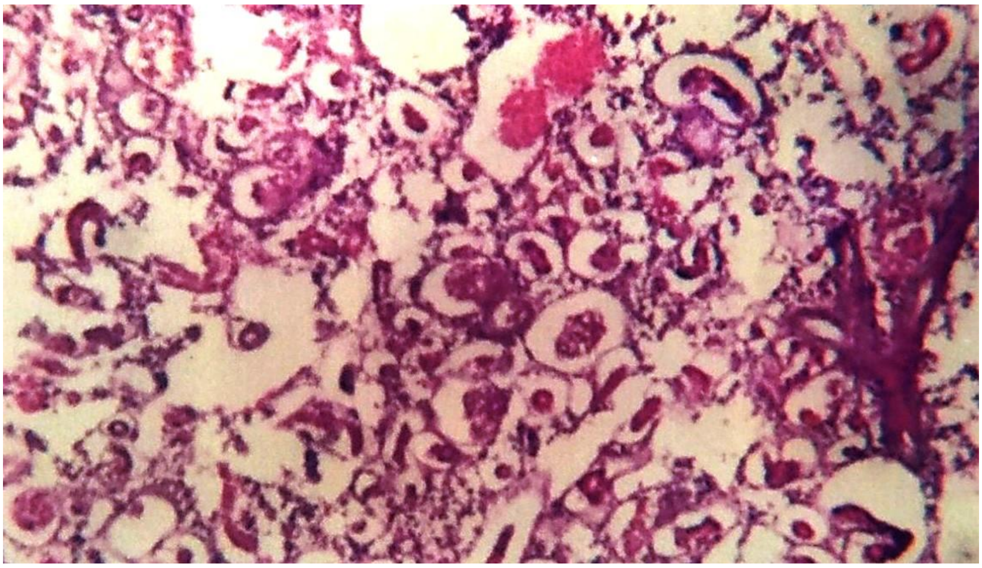

Fig.5 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion50 mg/L for 15 days.

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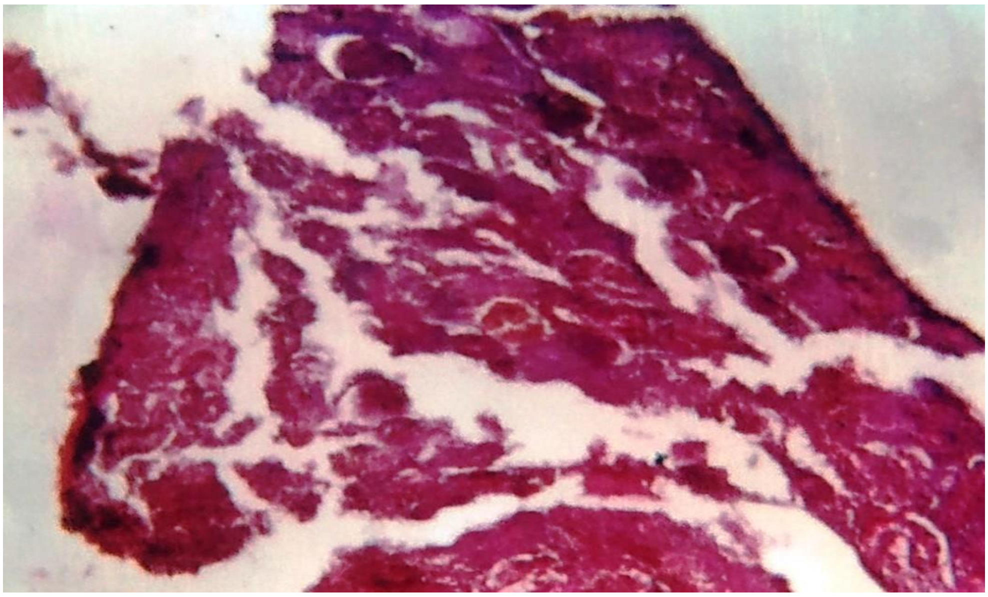

Fig.6 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 50 mg/L for 30 days

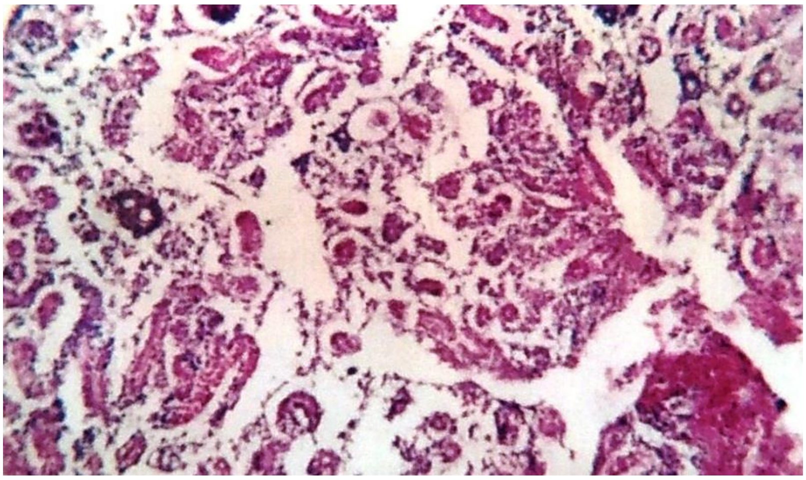

Fig.7 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 50 mg/L for 60 days.



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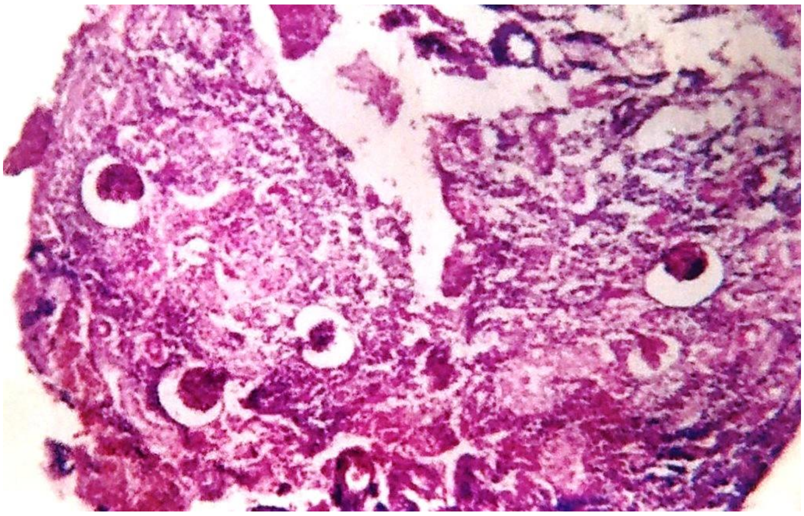

Fig.8 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 75mg/L for 15 days.

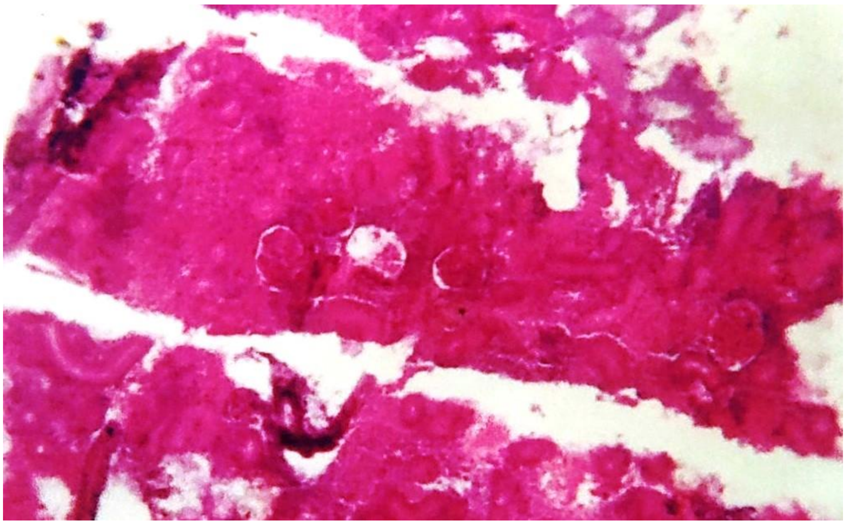

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Fig.9 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 75mg/L for 30 days.

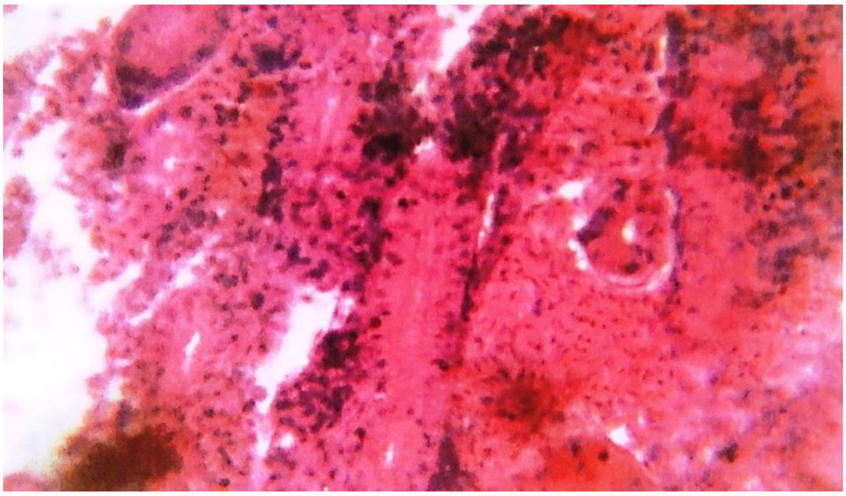

Fig.10 Kidney of *Heterpnuestes fossillis* showing fusion secondary lamellae, swollen chloride cells and slight vacuolation after exposure of Malathion 75mg/L for 60 days.

In the present study, shrinker tubules were found in malathion treated kidney and dilated nuclei of tubules were seen in malathion treatment. Again, chlorpyrifos resulted in elongation of renal tubules. The changes in the size of tubules could be the consequence of changes in kidney function (Patel and Bahadur, 2010). Different authors reported different types of alteration in the renal tubules of the fish kidney after exposure to different toxicants. Enlargement of renal tubules was reported by Muthukumaravel *et al.* (2013b) in monocrotophos treated kidney of *Labeo rohita*.

The changes in the size of cells and the narrow lumen could be the consequence of changes in kidney function. The fact that the physiology of the tubule cells is affected may be noticed by the nuclear changes too.

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**REFERENCES:**

Ahmad B., Qureshi T.A., Manohar S., Kaur P. and Khaliq R., (2011). Effect of cadmium chloride on the histoarchitecture of liver and kidney of a freshwater catfish, *Clarias batrachus*, Int. J. of Env. Sc., 2(2), 531- 536.

Azmat, H., Javed, M. and Jabeen G. (2012) Acute toxicity of Aluminium to the fish (C. catla, L. rohita & C. mrigala). Pakistan Vet. J., 31: 30–34.

Ebrahimpoure, M., Alipour, H. and Rakhshah, S. (2010) Influence of water hardness on acute toxicity of copper and zinc on fish. Toxicol. Indus. Health., 26: 361–365.

Gralla, E.J. (1981) Scientific considerations in monitoring and evaluation toxicological Research. M.C. Graw Hill International Book Company Washington D.C. New York,London P 141.

Haque M., Ahmed, M. and Mustafa, M.G. (2012). Preferences of fishes to different types of Katha materials used in sanctuaries in three rivers of Netrokona, Bangladesh. Bangladesh J. Fish. 30:147-156.

Kousar, S. and Javed, M. (2012) Evaluation of acute toxicity of copper to four fresh water fish species. Int. J. Agric. Biol., 14: 801–804.

Muthukumaravel K., Rajaraman P., Nathiya N., Govindarajan M. and Raveendran S., (2013b) Studies on the histopathology of selected organs of freshwater fish Labeo rohita exposed to pesticides monocrotophos, Int. J. of Recent Scientific Res. 4 (11), 1728-1735.

Patel, J.M. and A. Bahadur (2010) Histopathological alterations in Catla catla induced by chronic exposure of copper ions. J. Cell Tissue Res., 10, 2365-2370.

Singh, R. P. (2012) Comparison of organochlorine pesticide levels in soil and groundwater of Agra, India. Bull. Environ. Contam. Toxicol. 67:126-132.

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