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Effect of Cadmium Nitrate on Histopathology of Stomach of Fish Channapunctatus

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Abstract: ***This study was carried out on fish channapunctatus to investigate the effect of lethal concentration of cadmium nitrate on histopathological study of stomach compare to control one.96 hr. LC_{50} for cadmium nitrate is 0.57 ppm. Which is toxic to fish stomach should marked changes. After exposure to toxic cadmium nitrate at 96 hr. LC_{50}.***

Keywords: Pollution, Cadmium nitrate, Histopathology, Stomach, channapunctatus

1. Introduction

This limited database is specifically a problem, where little is known about the histopathological effects of various toxicants, including heavy metals on endemic fish species. More specifically, little information is available on histology and histopathology of endemic fish species.

The morphology and normal histology of the ultra structure of pancreas, liver and gallbladder of O. massambicus have been described by Geyer (1989) but further research in this field is necessary to contribute to this limited data base environmental pollution in aquatic ecosystems is usually at low level but chronic in nature by combining physiological and histological studies with more traditional toxicity tests, one can gain awareness into the mode and site of toxic action as well as the fish specific response regarding the time period exposed to the metals. This will assist in determining environmentally safe concentrations of toxicants. (Morsey andpro tasowicki, 1990).

2. Material and Methods

The selected model animals the freshwater fish channapunctatus were collected from yeldari dam parbhani district after collection. The fishes were acclimatized in the laboratory condition at room temperature for 2-3 days. The active acclimatized fishes of approximately same size were selected for experiment.

Before starting the experiment these fishes were divided into two groups one group of fishes was maintained as control while the second groups was exposed to chronic does of cadmium nitrate 96 hrs. LC_{50} 0.57 ppm

Processing of Tissues for Histopathological Studies

The tissue removed from the test fish washed in 0.90% saline solution for two times for remove blood or debris attached on external surface. The tissues were then cut into small pieces of approximately 3-5 mm.

Fixation of Tissues

The aim of fixation is the preservation of cells and tissue, existing during life, prevention of autolysis, loss of easily diffusible substances by appropriate coagulation tissues were fixed in Bouine's fluid. The tissue was kept in fixative for 6-24 hrs. (Drury and wallington, 1980).

Postfixation Process

After fixation of tissue washed three times in clean cold water to remove yellow colour.

Dehydration

Ascending grades of aquous ethyl alcohol beginning with 30%, 50%, 70%, 90% and absolute alcohol. Then clean with xylene for 2 min and transferred in xylene + melted paraffin mixture (1: 1) for one hour. Tissue were transferred in to melted paraffin at room temperature till solidification (Drury and Wallington, 1980).

Embedding

To lubricate a thin layer of glycerol was placed in cavity. Melted wax was poured and allowed to stand for sometimes. With warm forceps tissues were taken and put in the middle cavity. Which then paced in cold water and blocks were removed surplus wax was cut from sides.

Section Cutting

5 um thicknesses of sections were selected in the form of ribbons of 10-15 cm in length.

Mounting

A mixture of egg albumin and glycerol was smeared very thinly on slide before mounting. Section was gently lowered onto the water surface (5-10c^0) sections were flattered by gentle heat Drury and Wallington, 1980) de-waxing was carried out by giving two washes in xylene for 5 mins.

Hydration

Sections were run through down grading of alcohol i.e. 90%, 70%, 50%, 30% alcohol for 2-5 min.

Staining

Stained with Haematoxylin for 15-20 mins. Then washed slide under running tap water for 2-3 mins. Then quick dip of 0.5 - 1% Hcl in 70% alcohol for a few seconds. Then stained the slide in 1% aqueous Eosin for 1-3 mins. slide was dipped in 90% and 100% alcohol for a few minutes.

Mounting:

For drying and preservation slides were kept at room temp for 3-4 days.

Micropotographs of Slides:

After 4 days, mounting slides were used for microphotographs, done by binocular microscope (Labomed LX-400) with attached camera ivμ 5100 Labomed.

3. Results

In the present investigation histopathological studies of stomach on fish channapunctatus were done in fishes exposed to 96 hours LC_{50} of cadmium nitrate. The histological changes were noticed in stomach. The histological changes in the tissues of exposed fishes were compared with that of the control fish.

Histological Study of Stomach:

Control:

Stomach basically is a structure meant for the storage of food, stomach assumes different shapes according to the availability of space in the body cavities of different fishes. In the present study the control stomach shows gastric pats, mucosa, muscularis, submucosa and gastric glands were observed (Fig No. A).

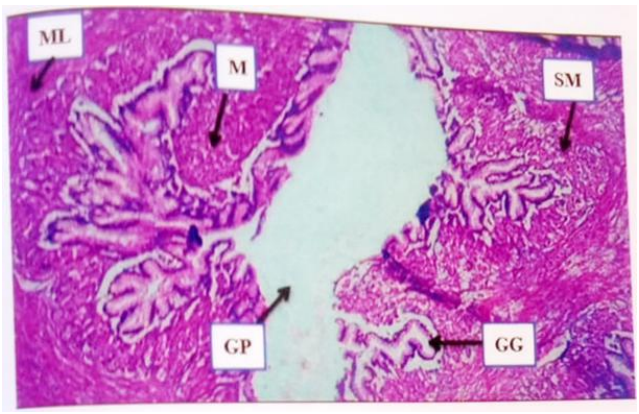

Figure (A): Photomicrograph of Channapunctatus control stomach shows Gastric pits (GP), Mucosa (M), Muscularis (ML), Submucosa (SM) and Gastric glands (GG) Control stomach H/E-100X

Histopathology of Stomach: (Experimental)

The test fish exposed to the cadmium nitrate at 96 hours shows the alterations in the normal stomach when compared with histological structure.

In exposed fish stomach shows columnar epithelial cells, degeneration on mucosa, degeneration of villi, vacuoles in muscular layer, swelling of lamina reduction and fusion of stomach microvilli degenerate of the sub mucosal zone. The microvilli lost their normal appearance and become highly folded and vacuole formations, shrinkage of villi were noticed (Fig no. B)

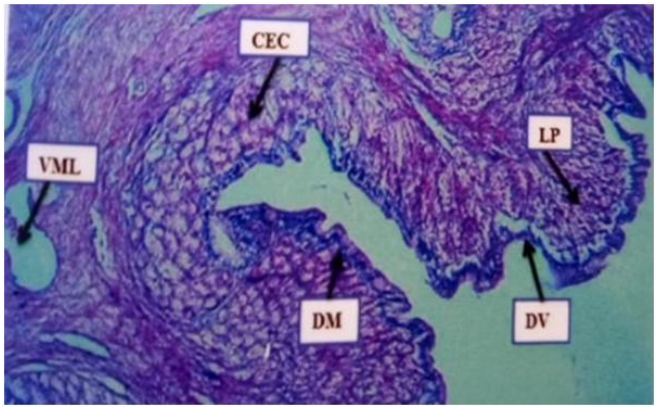

Figure (B): Photomicrograph of Channapunctatus stomach after exposed to cadmium nitrate at 96 hours shows Columnar epithelial cells (CEC), Degeneration on mucosa (DM), Degeneration of villi (DV), Vacuoles in muscular layer (VML) and Swelling lamina propria (LP)

4. Discussion

Senapati et al (2013) reported that exposure of Almix 20WP 20klp herbicide to the stomach of Anabas testudineus (cuvire) and showed the degeneration and vascuolation in the basal region of the gastric epithelium columnar epithelial cells were degenerated in some areas and damage of gastric gland. The similar finding noted on investigation the stomach of channapunctatus exposed to the cadmium nitrate for 96 hrs. LC50.

Amminikutty and Rage (1977) worked on stomach of Gymnocorymbusternitzi after chronic expouse of endosulfan and methyl ethyl mercurial and reported that the swelling, distortion and vascuolation with a tendency to necrotization in the mucosal epithelial cells of stomach.

Ghanbahadur (2012) reported Vacuolization in the Submucosa, Shrinkage of mucosal folds in the stomach oflarvivorous fish Rasboradaniconius due to toxic effect of endosulfan.

Saeeda Fatima, et. Al (2014) studies on effect of hydrolyzed leather shavings as food activities to the fish rohu (Labeorohita) fingerlings and reported that pykonosis, necrosis, disruption in the outer lining of longitudinal muscles, degeneration and development of fibrosis, degeneration of epithelial lining, gaps appeared between the gastric glands and vascuolization was also apparent in the gastric glands epithelium in the stomach.

Joycelyn Jumawan (2015) studies on histopathological effects of sub acute lead chloride on the stomach of catfish pterygoplichthyspardalis and observed that the stomach wall and destruction of the mucosa, respiratory cells exhibited pyknosis while a portion of granular cells appears necrotic. He stated that there was also a collapse of the epithelial lining of the stomach in some samples.

5. Conclusion

In the exposed fish stomach shows columnar epithelial cells, degeneration on mucosa, degeneration of villi, vacuoles in muscular layer, swelling of lamina Propria reduction and fusion of stomach microvilli degenerate of the sub mucosal zone. The microvilli lost their normal appearance and become highly folded and vacuole formation, Shrinkage and villi were noticed (Fig B).

After above overall consideration the result it has been concluded that heavy metal cadmium nitrate causes harmful effects on fish channapunctatus and significantly alters the normal structure of cell and ultimately growth of the fishes. Affected growth of fish possibly affects the whole community and tropic level of food chain and ultimately on the aquatic ecosystem.

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