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HISTOENZYMOLOGICAL OBSERVATIONS ON ACID PHOSPHATASE ACTIVITY IN THE OESOPHAGUS OF $HGCL_2$-TREATED FISH, *LABEO ROHITA*

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ABSTRACT

Present studies incorporate gullet-toxic effects of $HgCl_2$ on the relative distribution of acid phosphatase activity in the oesophagus of fish, *Labeo rohita*. It was observed that there appears to be slightly decreased ACP activity accompanied by histolytic changes in the columnar epithelial cells lining of mucosal villi and glands of the oesophagus of treated herbivorous fish. However, in control, these changes were invisible.

Key words- *Labeo rohita*, ACP, $HGCL_2$

INTRODUCTION

Many workers notably Sastry (1975), Chakravorty and Sinha (1982), Hirji (1983), Arellano and Storch (2001), Song et al (2012) and Magall et al (2013) have studied the qualitative distribution of ACP activity in the oesophagus of fishes. Sastry and Gupta (1978a), Sastry and Gupta (1978b), Sastry and Gupta (1978c), Verma et al (1986), Gill et al (1990) and Zeynab et al (2013) reported various effects of heavy metals such as Cd, Pb, Hg, Cr and chemical compounds on the distributions of phosphatases in the oesophagus of fishes. Oesophagus of *Labeo rohita* is a short narrow tube –like structure. Its numerous lining forms seven prominent longitudinal folds and several smaller folds in between them. Mercuric chloride ($HgCl_2$) a known potent Cirrhosis agent that is commonly found as traces in the polluted water and industrial wastes is known to cause various histo-physiological effects on various biological organs specially gills, kidneys, livers and digestive tracts of fishes. However, Histochemistry of oesophagus of bony fishes and effects of heavy metals and toxins on them have received insufficient attention during the past decades. Present study deals with the

PLATE- 1

Fig.1. C.S of a part of oesophagus of *Labeo rohita* magnified x500. Note diffused ACP reaction with erosion of mucosal layer and submucosa. Arrows mark lytic effects.

Fig.2. C.S. of a part of oesophagus of *Labeo rohita* magnified x800. Note ACP reaction is strong along the borders of mucosal folds (MF) and mucous glands (MG)

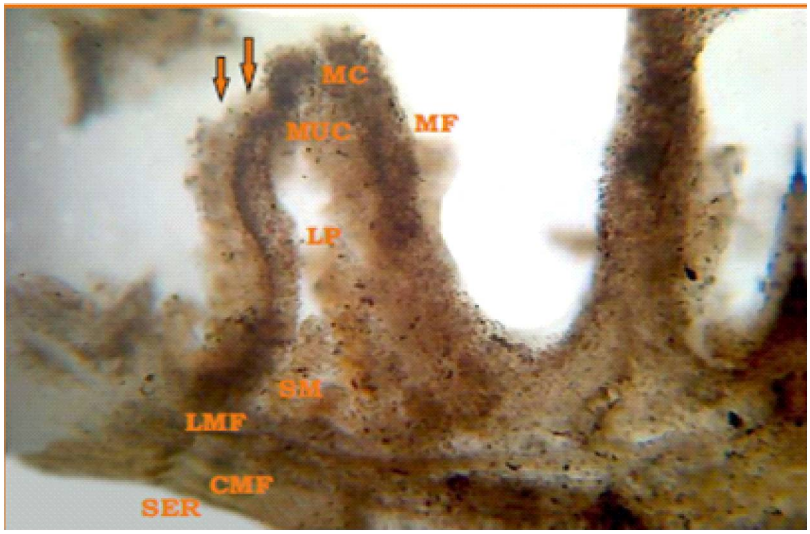

Fig. 1

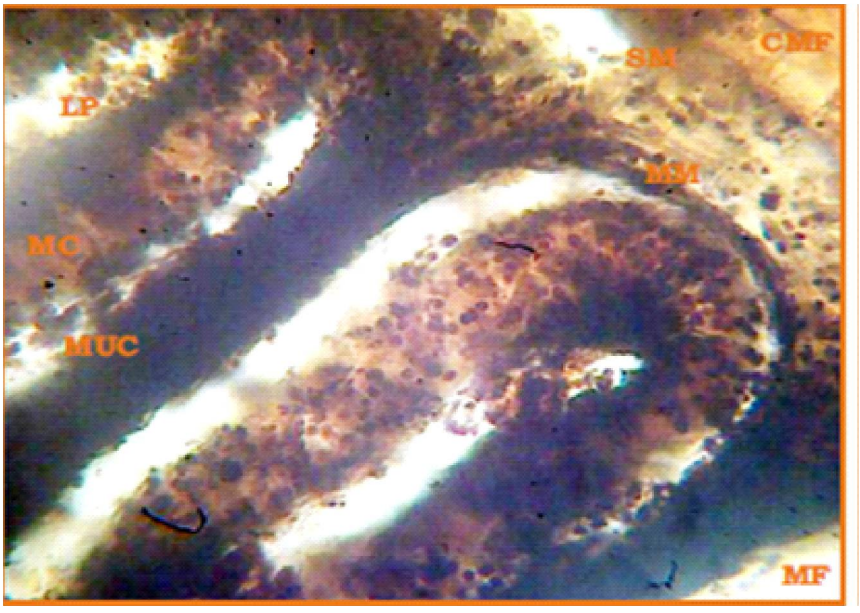

Fig. 2

histoenzymological localization of ACP reaction in the oesophagus tissues of fresh water bony fish, *Labeo rohita* following the administration of $HgCl_2$.

MATERIAL AND METHOD

The living fresh water herbivorous fish, *Labeo rohita* (weighing 160 gm approx.) were collected from Umaid Sagar , Jodhpur. They were kept in aquarium for about 24 hours before subjecting them to experimental treatment. For determining the effect of $HgCl_2$ on the distribution of acid phosphatase in the oesophagus of *Labeo rohita*, 1 ml of 0.0001% approx. solution of $HgCl_2$ (mercuric chloride) was injected into the body cavity of the herbivorous fish. After 14 hours the fish was dissected out and the small pieces of oesophagus were fixed in 10% neutral chilled formalin for 12-14 hours at 4æ%C. Frozen sections of the oesophagus were cut 10-15µ with the help of cryostat and were processed for the localization of acid phosphatase activity using Gomori's technique (1952).

RESULT AND DISCUSSION

It was observed that ACP activity in the oesophagus of $HgCl_2$ –treated *L. rohita* showed relatively decreased as compared to control. In the oesophagus $HgCl_2$-induced toxicity resulted in the surface epithelial layer of terminal region of mucosal villi seemed to erode followed by Cytoplasmic extrusion of the contents. The connective tissue of submucosa and muscularis became loose and disorganized. Lumen of the oesophagal villi displayed mild ACP activity as indicated by distribution of less numbers of lysosomal granules (Plate-1, Fig. 1). On the other hand, in control experiment, ACP rich lysosomal granules were more concentrated in the epithelial cells of mucosal villi where intense deposition was found. Mucous glands showed strong acid phosphatase activity as denoted by more concentration of lysosomal granules. Whereas, lumen of the oesophageal villi, submucosa and muscular layers showed scattered lysosomal activity (Plate-1, Fig.2). The functional significances of acid phosphatase in oesophagus of fishes have been stated by many workers notably Goel (1975), Chakravorty and Sinha (1982). In addition, Sastry and Gupta (1978) reported the effects of $HgCl_2$ sublethal concentration (0.30 mg/l) on the acid phosphatase activity was inhibited after the first week of treatment. Kozaric et al (2004) reported that in control, high intensity of acid phosphatase activity along the borders of mucosal folds and their glands may be related to high metabolic activities and reflects their role in secretary processes. My present observations confirm the findings of these workers with regard to degradation of ACP enzymic activities and disorganization of oesophageal tissue in $HgCl_2$- treated fish.

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