

Histoenzymological Observations on Acid Phosphatase Activity in the Posterior Intestine of HgCl_2 -Treated Fish, *Channa striatus*

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ABSTRACT

Present studies incorporate enterotoxic effects of HgCl_2 on the relative distribution of acid phosphatase (ACP) activity in the posterior intestine of fish, *Channa striatus*. It was observed that there appears to be slightly increased ACP activity accompanied by histolytic changes in the columnar epithelial cells lining of villi and intestinal glands of the posterior intestine of treated carnivorous fish. However, in control, these changes were invisible.

Key words: ACP, *Channa striatus*, HgCl_2

INTRODUCTION

Many workers notably Goel (1975), Chakravorty and Sinha (1982), Imtiyaz and Ashok (2010), Kozaric et al (2011), Kuzir et al (2012) and Tlak et al (2013) have studied the Qualitative distribution of ACP activity in the intestine of fishes and birds. Sastry and Gupta (1978), Sastry and Malik (1979), Gupta and Sastry (1981) and Dalela et al (1982) discussed various effects of heavy metals, toxins and drugs on the distribution of phosphatase in the intestine of fishes. Pollution of aquatic environment is a serious problem that should be taken for higher concern. Aquatic pollution undoubtedly affects fish health and survival.

Heavy metals are common pollutants of the aquatic environment. These metals are slow poisoning and slow degradable substances which could have toxic effect for prolonged period. Mercury is one of the heavy metals found in nature. Some amount of mercury present in water enters into the digestive tract of fish through ingestion and food chain and can produce structural and functional disturbances. Interestingly, Mercury and its compounds accumulate in different tissues of aquatic organisms including fish (Dhanekar et al 1987). Mercurial compounds are well known for causing toxic effects in fish.

MATERIAL AND METHOD

The living fresh water carnivorous fish, *Channa striatus* (weighing 160 gram 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 posterior intestine of *Channa striatus*, 1 ml of 0.0001% approx solution of mercuric chloride was injected into the abdominal cavity of the

carnivorous fish. After 12 hours the fish was dissected out and the small pieces of posterior intestine were fixed in 10% neutral chilled formalin for 12-14 hours at 4°C. Frozen sections of the posterior intestine were cut 5-10 μ with the help of freezing microtome and were processed for the demonstration of acid phosphatase activity using Gomori's method (1952).

RESULT AND DISCUSSION

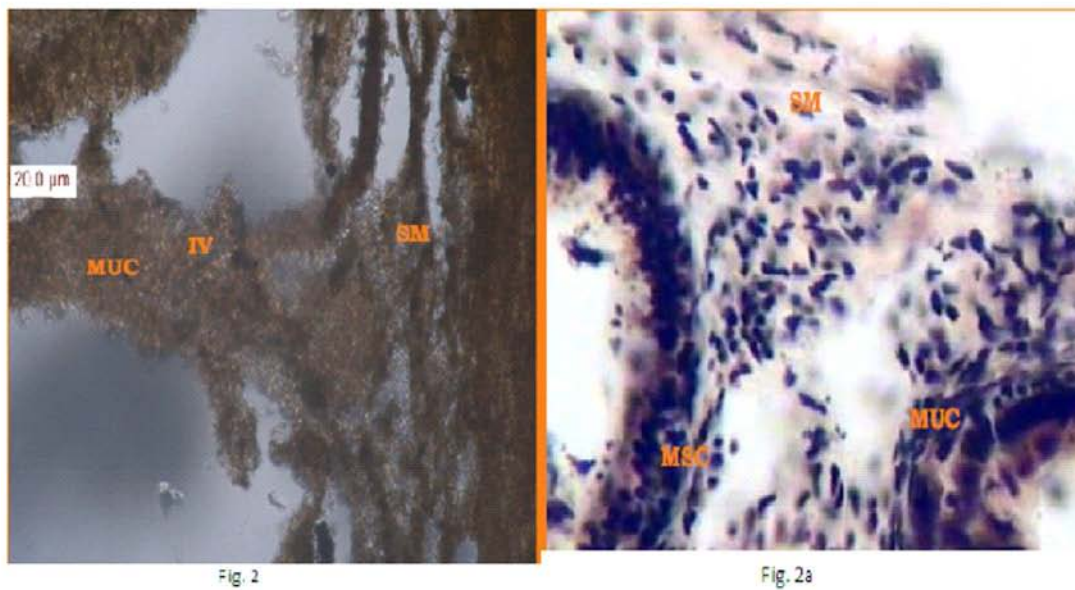
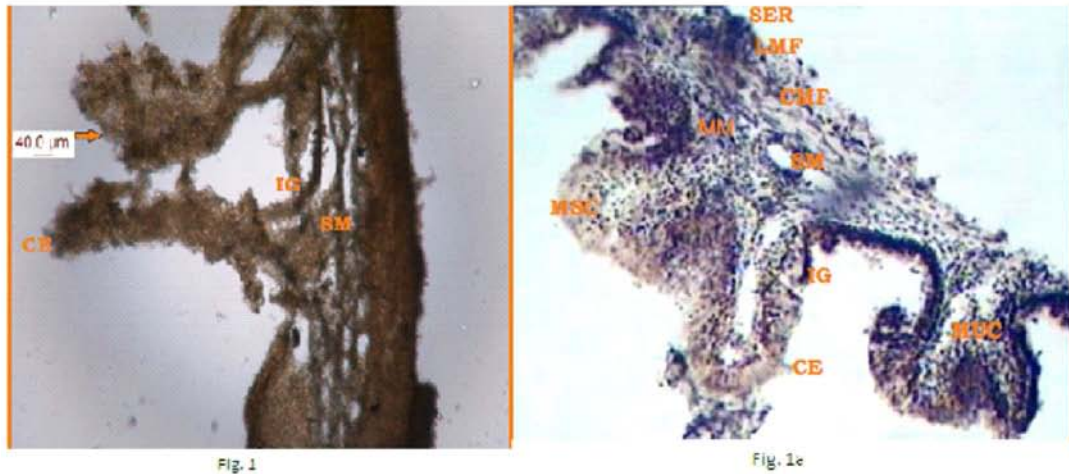
It was observed that ACP activity in the posterior intestine of $HgCl_2$ -treated *C. striatus* displayed relatively increased as compared to control. In the posterior intestine, $HgCl_2$ -induced toxicity resulted in the surface epithelial layer of terminal and lateral regions of intestinal villi seemed to erode followed by cytoplasmic extrusion of the contents. The connective tissue of submucosa and muscularies became loose and disorganized. Lumen of the intestinal villi showed strong ACP activity as indicated by distribution of larger numbers of lysosomal granules (Plate-1, Figs. 1 and 2). On the other hand, in control experiment, ACP rich lysosomal granules were less concentrated in the brush border epithelial cells of intestinal villi where mild deposition was found. Intestinal glands showed mild ACP activity as denoted by low concentration of lysosomal granules along their inner borders. Whereas, lumen of the villi, submucosa and

muscle layers exhibited scattered lysosomal activity (Plate-1, Figs. 1a and 2a). The functional signification of acid phosphatase in different parts of the intestine of fishes have been stated by many workers notably Chakravorty and Sinha (1982), Imtiyaz and Ashok (2010), Kozaric et al (2011), Kuzir et al (2012) and Tlak et al (2013). The effects of various entero-toxins, heavy metals and drugs in the intestine of fishes have been stated by many workers notably Sastry and Gupta (1978), Sastry and Malik (1979) and Gupta and Sastry (1981). Recently, Debora et al (2014) reported slight elevation of acid phosphatase activity in the intestinal parts of juvenile dourado, *Salminus brasiliensis* when fed different concentration of bovine colostrum. My present observations confirm the findings of these workers with regard to elevation of ACP enzymic activities and structural disorganization of intestine tissue.

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Plate - 1



Figs. 1 and 2. C S of a part of posterior intestine of $HgCl_2$ -treated *Channa striatus* magnified 150x and 600x respectively. Note erosion of the borders of intestinal villi (IV).

Figs. 1a and 2a. C S of a part of posterior intestine of *Channa striatus* magnified 150x and 900x respectively. Note ACP reaction on the borders of villi (IV), submucosa (SM), and serosa (SER) show positive activity.

REFERENCES

- Chakravorty, P and Sinha, G.M. (1982) : Detection and localization of alkaline and acid phosphatases in the digestive system of the adult *Catla catla* (Hamilton), an indian freshwater major carp by histochemical methods J. Gegenbaurs morphologisches Jahrbuch, 128(2), 799-808.
- Dalela, R.C., Rani, S. And Verma, S.R. (1982): Acid phosphatase activity in tissues of *Notopterus notopterus* chronically exposed to phenolic compounds. Proc. Indian Acad. Sci. 91(1), 7-12.
- Debora, B.M., Wiolene, M.N., Thaline M.P.C., Jose, E.P.C and Raul, M (2014) Histochemistry of intestine enzymes of juvenile dourado *Salminus brasiliensis* fed bovine colostrum. International J. Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering. 8(9), 1031-1035.
- Dhanekar, S., Shrivastava, S., and Rao K.S. (1987): Experimental studies on accumulation of mercury in different fish tissues. J. Perspectives in Hydrobiology. 3(18), 87-89.
- Goel K.A. (1975): Histochemical study of the activity of acid and alkaline phosphatases and lipase in the gastro-intestinal tract of *Cirrhinus mrigala*. J. Acta Histochemica, 54(1): 48-55.
- Gupta, P.K. and Sastry, K.V. (1981): Effect of mercuric chloride on enzyme activities in the digestive system and chemical composition of liver and muscles of the catfish, *Heteropneustes fossilis*. Ecotoxicology and Environmental safety, 5(4), 389-400.
- Imtiyaz, H.M., and Ashok, C (2010) : Histochemical Distribution of Lipase and Acid Phosphatase in the intestinal tract of the snow trout, *Schizothorax curvifrons* Heckel.
- Kozaric, Z., Petrincic, Z. , Kuzir, S., Gjurcevic, E and Bazdaric, B (2011): Histochemical Analysis of Digestive Enzymes in the intestine of adult large - scaled Gurnard (*Lepidotrigla cavillone*, Lacepede 1801) J. Anatomia, Histologia, Embryologia. 40(4),314-320.
- Kuzir, S., Gjurcevic, E., Nejedli, S., Bazdaric, B. and Kozaric, Z. (2012): Morphological and Histochemical study of intestine in wild and reared European eel (*Anguilla anguilla* L.). Fish physiology Biochemistry. 38, 625-633.
- Sastry, K.V. And Malik, P.V. (1979): Studies on the effect of dimecron on the digestive system of a fresh water fish, *Channa punctatus*. Archives of Environmental contamination and Toxicology. 8(4), 397-407.
- Sastry, K.V. and Gupta, P.K. (1978): Histopathological and enzymological studies on the effects of chronic lead nitrate intoxication in the digestive system of a freshwater teleost , *Channa punctatus*. Environmental Research. 17(3), 472-479.
- Tlak, G., Nejedh, S. And Kozaric, Z. (2013): Histochemical distribution of digestive enzymes in the intestine of the common two-banded Sea Bream, *Diplodus vulgaris*. J. Anatomia, Histologia, Embryologia. 42(3): 161-167.



A Severe Fruit Rot In Market

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The diseases play an important role in this great balancing act of nature. According to Smith *et al.* (1964) there are more than 250 known diseases of fruits and vegetables of them more than 150 diseases are caused by fungi. The data collected from some studies carried out in India on post-harvest diseases of fruits and vegetables, put the average loss at 20-30 percent (Mehta 1975). The injured *Averrhoa caroliniana* L. gets infected by fungal forms during Transit and storage the vegetable is commercial product utilized for edible. A survey in market and storage was made Hathras and Aligarh. the extent of the rotting ranged from 18-25% a time, the whole consignment is rendered unfit for human consumption. The diseased fruits were collected separately in sterilized in polythene bags and brought to laboratory for carrying out the present investigation.

The affected tissues were soft, brown, black and watery. Under atmospheric conditions reddish mass of spores appeared on the surface rotten tissues. (fig1)

To isolate the pathogen diseased fruits were surface with 0.1% $HgCl_2$. And cut in to

small bits which plated on P.D.A. and Czapek's agar media and incubated at $28^{\circ}C \pm 2^{\circ}C$. The fungi were isolated and the pathogenicity was tested with.

Replicated by artificial inoculation method of Tendon and Mishra (1969). Inoculated fruits were incubated at $28^{\circ}C \pm 2^{\circ}C$. corresponding controls were maintained. The fungi produced soft rot on fruits within 4-5 days and re-isolation from the yielded the same organism.

FUSARIUM OXYSPORUM ROT:-

The pathogen caused soft rot of kamrakh only through injury, which develops in the form of small circular green whitish green patches of 3rd day of incubation, increased in perimeter with the increase in incubation period, ultimately forming irregular with dark reddish cavity below the infected light brown-red rind. Internally the tissues were found to be macerated. The looked peach colour and emitted pungent smell. The pathogen decayed about 28-32% fruits tissues within 8 days of incubation.

FUSARIUM SOLOMI ROT:-

The fungus also developed soft rot. The incident tissues turned dark brown, black and water soaked with pungent smell exuded from the rotten tissues about 28-30% rot was recorded on 8th day of incubation.

TRICHODERMA VIRIDE ROT :-

The pathogen caused soft rot of kamrak only through injury, which develop in the form of small circular green whitish green patches of 3rd day of incubation, increased in parameter with the increase in incubation period, ultimately forming irregular with dark green cavity below the infected light brown-red ring. Internally the tissues were found to be macerated. The looked peach color and

emitted bad smell. The pathogen decayed about 20-22% fruit tissue within 8days of incubation.

ASPERGILLUS FLARUS ROT:-

Induced soft rot black rot that spread rapidly to spoil nearly half of the incubated fruits within 8 days and developed irregular shallow depression accompanied with secretion of black-yellow symptoms associated with the disease. The pathogen spoiled about 25% fruits within 8 days.

Latest work on fruit and vegetable rot given here. Pre-harvest rot of vegetable and fruits (Singh and Surbali 2001), occurrence of vegetable rots in market (Sharma and Som Kumar 2007) Sharma and Robin (2008), Verma (2009) soft rot of khira (Sharma and Khan 2011), New market disease of Ramphal (Sharma *et al* 2012).

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REFERENCES

- Prasad S.S and Bilgrami R.S.(1973) at different humidities & temperature the percentage Indian Phytopathology, 26:517-552
- Sharma, R.B., Sandeep Kumar and I. Khan (2012) new market Disease of Ramphal Bio Science Guardian 2(1):177
- Sharma R.B. Som kumar (2007) occurrence vegetable rots in market. J. of curr. Bio Science 1(1):61-65
- Sharma R.B. and I. Khan (2011) soft rot of Khira Bio Science Guardian 1(2):512.
- Sharma N.D. and Robin Gogoi (2008) first report sclerotium rolfsii On Tulsi (ocimum sanctem) from india Indian Phytopathology 61(3):370.
- Singh Y.P. and Surbali G (2001). Pre harvest Rot of vegetable and fruits. Ind. Phytopathology 53:492.
- Tandon R.N. and Mishra A.N. (1969) Pathogen city test by knife injury Ind Phytopathology 20:1-12.
- Verma V.S.(2009) Incident of post harvest fungal rot of kin now Maudarin and their management Indian Phytopathology 62(3):335-336.

