

## EFFECT OF CADMIUM CHLORIDE ON THE BIOCHEMICAL CONSTITUENTS OF VARIOUS TISSUES OF THE FRESH WATER FISH, RASBORADANICONIUS

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### **ABSTRACT:**

*Different environmental pollutants are likely to affect biological system in different ways according to their respective chemical properties alteration in the environmental factors induced changes in the protein metabolism of an organism carbohydrate play vital and central role in cellular biochemistry. In the animal the chief carbohydrate of the tissues is glycogen lipids are heterogeneous group of water in soluble (hydrophobic) organic molecules that can be extracted from tissues by non-polar (organic) solvent. Effect of different concentration of cadmium chloride on the biochemical constituents such as total protein, glycogen and lipids were studied in various tissues of the fish, RasboraDaniconius.*

*The fish tissues like, gills, intestine, muscles and ovary were analysis to see the effect after 15 days with both concentration (5 and 7.5ppm) produce a significant decrease in protein, glycogen and lipid contents in all tissues of the fish.*

***Keywords:** Cadmium chloride, gills, intestine, muscles, and ovary, Rasboradaniconius.*

### **INTRODUCTION:**

In recent year the pollution of aquatic environment has become a serious problem with increasing agricultural and industrial operation, as a consequence of which the non-target organisms are perishing in the process as a waste water are the prominent source of aquatic solution this waste contain toxic substances in the form of pesticide residues, heavy metal salts, oil, radioactive substances the intrusion of such innumerable pollutant individually and in combination in nature water cause ecological abnormalities. Protein metabolism is essentially the metabolism of the free amino acid. Free amino acid play vital role in maintaining the intra cellular osmotic balance during physiological trace condition shivprasad et.al. (1981) sornarayet.al. (1995) reported on the influence of heavy metals on bio chemical responses of the fresh water air breathing fish, channapunctatus. Das (2000) studied the chronic effect of cadmium on bio chemicals of catfish, clariasbatrachus

## MATERIAL AND METHODS:

The fishes *Rasbora daniconius* were collected from Godavari River at Paithan they were acclimatized to laboratory conditions for two to three days in big glass aquaria containing sufficient quantity of tap water before experimentation active and healthy looking fishes of approximately same size (7 to 9 cm) and weight (5 to 7 gm.) were sorted. The fishes were grouped of 10 in each. Simultaneous control grouped was maintained concurrently in tap water. To investigate the effect of cadmium chloride of the biochemical constituents like proteins, glycogen, and lipid of muscle, intestine and gills, the fishes were divided into two groups of 10 each. Sub lethal concentrations used to exposed fishes for 15 days were 5ppm and 7.5ppm of cadmium chloride. After 15 days the abdominal muscle, intestine, ovary, and gills were dissected out separately in watch glasses. The wet tissue was weighed and used for the analysis of biochemical constituent using the method as estimation of total proteins by Lowry et.al. (1951), estimation of glycogen by Dezwaan and Zandee, 1972 and estimation of lipid by Barns et.al. (1973)

## RESULT AND DISCUSSION:

Effect of different concentration of cadmium chloride on the biochemical constituents such as total proteins, glycogen were studied in various tissues of the fish *Rasboradaniconius*. The fish tissues like gills intestine, muscle, and ovary were analyzed to see the effect after 15 days.

### PROTEIN:

Both concentrations (5 and 7.5 ppm) produced a significant ( $P < 0.05$ ) decrease in protein contents in all tissues of the fish, *Rasboradaniconius*. In the gills of normal fish (control), the protein concentration was found as 32.3 mg % (Fig. 1). In the gills of treated fish a decrease of 24% and 35.6% was observed after exposure to 5 and 7.5 ppm respectively. In the intestine of normal fish (control) the protein concentration was found to be 48.7% (Fig. 2). In the intestine of exposed fish, 5 ppm and 7.5 ppm of cadmium chloride induced a significant ( $P < 0.05$ ) decrease of 28.6% and 40.2% respectively. In the muscles of normal fish 46.7 mg % protein was found (Fig. 3). In the muscles of experimental fish significant ( $P < 0.05$ ) decreases of 22.6% and 33.2% were observed in protein contents after exposing to 5 and 7.5 ppm of cadmium chloride respectively The ovary of normal fish contained 63.3 mg% of protein (Fig. 4). Maximum decrease in Both concentrations (5 and 7.5 ppm) produced a significant ( $P < 0.05$ ) decrease in protein contents in all tissues of the fish, *Rasbora daniconius*. In the gills of normal fish (control), the protein concentration was found as 32.3 mg % (Fig. 1). In the gills of treated fish a decrease of 24% and 35.6% was observed after exposure to 5 and 7.5 ppm respectively in the intestine of normal fish (control) the protein concentration was found to be 48.7% (Fig. 2). In the intestine of exposed fish, 5 ppm and 7.5 ppm of cadmium

chloride induced a significant ( $P < 0.05$ ) decrease of 28.6% and 40.2% respectively. In the muscles of normal fish 46.7 mg % protein was found (Fig. 3). In the muscles of experimental fish significant ( $P < 0.05$ ) decreases of 22.6% and 33.2% were observed in protein contents after exposing to 5 and 7.5 ppm of cadmium chloride respectively. The ovary of normal fish contained 63.3 mg% of protein (Fig. 4). Maximum decrease in protein content was observed in the ovary as compared to other tissues. 27.4% and 44% decreases in protein content were observed in the ovary of fish exposed respectively to 5 and 7.5 ppm of cadmium chloride.

### GLYCOGEN:

Both concentrations (5 and 7.5 ppm) of cadmium chloride produced a significant ( $P < 0.05$ ) decrease in glycogen concentration in all the tissues of the fish, *Rasboradaniconius*.

In the gills of normal fish (control) the glycogen level was found as 16.1 mg % (Fig. 1) whereas in the gills of exposed fish, 5 ppm and 7.5 ppm of cadmium chloride induced a significant ( $P < 0.05$ ) decrease of 22.4% and 37.4% respectively. In the intestine of normal fish (control) the glycogen concentration was found as 26.4 mg. % (Fig. 2). In the intestine of treated fish, significant ( $P < 0.05$ ) decrease in the intestine of 28.6% and 40.7% was observed after exposure to 5 and 7.5 ppm of cadmium chloride respectively. In the muscle of normal fish (control) the glycogen concentration was found as 18.6 mg % (Fig. 3). In the muscle of experimental fish, significant ( $P < 0.05$ ) decreases of 19.8% and 28.4% were observed after exposing to 5 and 7.5 ppm of cadmium chloride respectively. The ovary of normal fish contained 38.8 mg % of glycogen (Fig. 4). Maximum decrease in glycogen content was observed in the ovary as compared to other tissues 27.6% and 42.9% decrease in the glycogen was observed in the ovary of fish exposed to 5 and 7.5 ppm of cadmium chloride respectively.

### LIPID:

Like protein and glycogen, lipid content in various tissues of the fish, *Rasbora daniconius* was found decreased after exposure to 5 and 7.5 ppm of cadmium chloride for 15 days.

In the gills of normal fish (control), the lipid content was found as 11.8 mg % (Fig. 1). In the gills of exposed fish, 5 and 7.5 ppm of cadmium chloride produced a significant ( $P < 0.05$ ) decrease of 14.3% and 20.3% respectively. In the intestine of normal (control) fish, the lipid concentration was found to be 13.7 mg % (Fig. 2). In the intestine of treated fish, significant ( $P < 0.05$ ) decreases in the lipid content of 26.6% and 35.7 % were observed after exposure to 5 ppm and 7.5 ppm respectively. In the muscles of normal fish 8.4 mg % of lipid was found (Fig. 3). In the muscles of experimental fish a significant ( $P < 0.05$ ) decrease of 15.8% and 25.6% was observed after exposing to 5

and 7.5 ppm of cadmium chloride respectively. The ovary of normal fish contained 68.3 mg % of lipid (Fig. 4), 29.8 and 42.7% decrease was found in the ovary offish exposed respectively to 5 and 7.5 ppm of cadmium chloride.

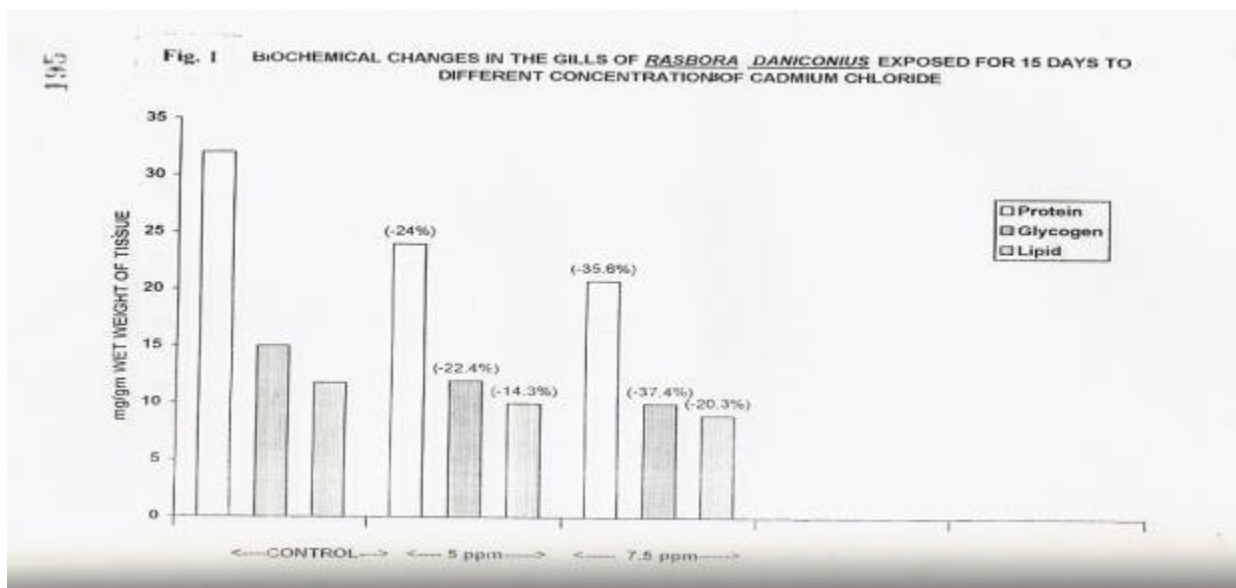
The present study is aimed to understand the cadmium chloride induced alterations in the protein, carbohydrate and lipid metabolites in the freshwater fish, Rasboradaniconius.

The fish R. daniconius after exposure to 5 ppm for 15 days, showed maximum depletion in the intestine (28.6%) followed by ovary (27.6%) , in gills (22.4%) and muscle (19.8%). The fishes were also exposed to 7.5 ppm for 15 days and the results obtained showed that maximum depletion in ovary (42.9%) followed by intestine (40.7%), in gills (37.4%) and muscle (28.4%).

## REFERENCES

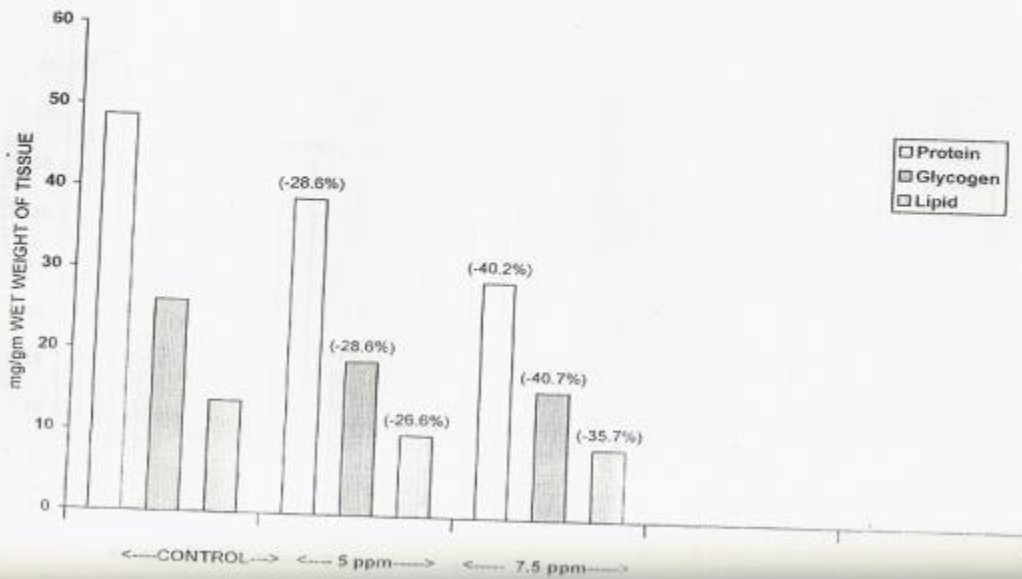
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## APPENDICES



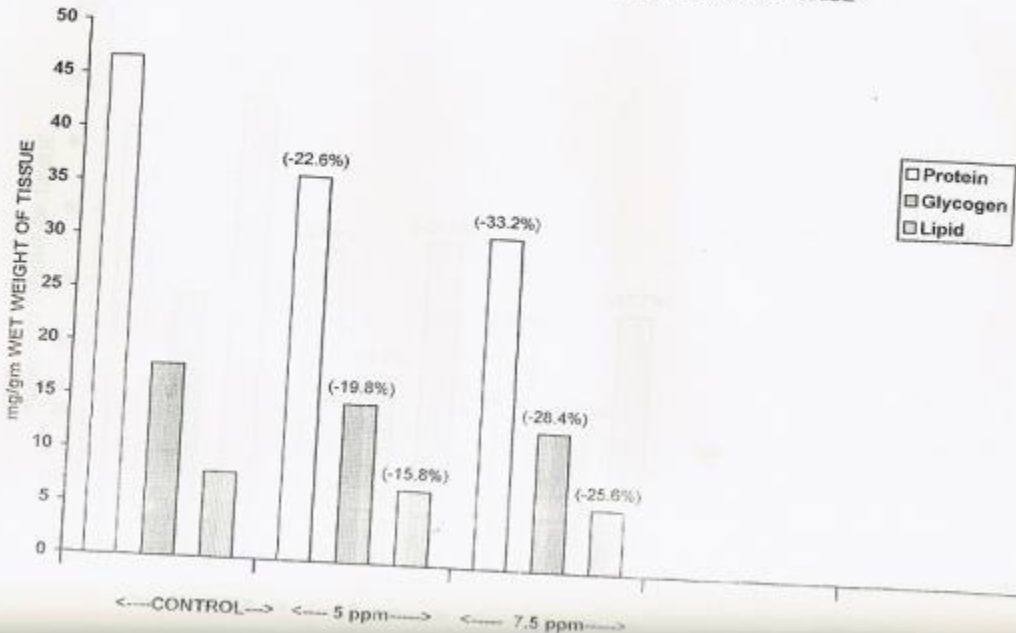
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Fig. 2 BIOCHEMICAL CHANGES IN THE INTESTINE OF *RASBORA DANICONIUS* EXPOSED FOR 15 DAYS TO DIFFERENT CONCENTRATIONS OF CADMIUM CHLORIDE



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Fig. 3 BIOCHEMICAL CHANGES IN THE MUSCLE OF *RASBORA DANICONIUS* EXPOSED FOR 15 DAYS TO DIFFERENT CONCENTRATIONS OF CADMIUM CHLORIDE



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Fig. 4 BIOCHEMICAL CHANGES IN THE OVARY OF *RASBORA DANICONIUS* EXPOSED FOR 15 DAYS TO DIFFERENT CONCENTRATIONS OF CADMIUM CHLORIDE

