



**PROTEIN AND AMINO ACID MODULATION IN FRESH WATER FISH *OPHIOCEPHALUS ORIENTALIS* EXPOSED TO CYPERMETHRIN**

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**ABSTRACT**

Cypermethrin, a synthetic pyrethroid showed non-target effects on the freshwater fish *Ophiocephalus orientalis*. The presents study showed the impact of sub lethal concentration (0.0007  $\mu$ /lit) of cypermethrin on the concentration of protein and amino acid in two tissues such as liver and muscle of freshwater fish *Ophiocephalus orientalis* at different time intervals. Decrease in protein level was observed in both tissues liver and muscle. But there was observed increase in amino acid level in both tissues muscle and liver of *Ophiocephalus orientalis* at different time intervals.

**Keywords:** Cypermethrin, liver, muscle, protein, amino acid.

**INTRODUCTION**

Water is main component of the environment which is dynamic entities. It has an effective means of transfer and transport of the waste and other materials. Soil on the other hand is stationary entities, which are indirectly affected by the contaminated water. Toxic waste dumped on a soil may cause harm to the animals and indirectly to human being. The structure and function of lotic ecosystems changed due to pollutants.<sup>1</sup> The toxic effect of contaminated water on non target organisms is observed by<sup>2,3</sup>. One among the environmental problems is the lack of proper management of domestic and industrial wastes which release hazardous chemicals. There is no doubt; these excessive levels of pollutants are causing a lot of damage observed in human and animal health. The organic pollutants may cause declines, deformity and death of autistic life, which in turn cause disease to humans<sup>4,6</sup>. The aquatic environment is very important because it is a store house of variety of fishery resource. Presently aquatic pollution a serious problem thought out the world. It has been estimated that about 70,000 manmade chemicals are used day to day. These chemical have contributed a lot to the green revolution but their deleterious effects on various ecosystems cannot be ignored<sup>7</sup>.

**MATERIALS AND METHODS**

The freshwater fish *Ophiocephalus orientalis* were collected from Wadali lake around Amravati region, India. The fishes were acclimatized at laboratory condition for 1 week. The LC<sub>50</sub> value was calculated by probity analysis method<sup>8</sup>. The LC<sub>50</sub> value is 0.0007  $\mu$ /lit at 72 h. The acclimatized fishes were exposed to sub lethal concentration for 24 h, 48 h, 72 h and 96 h; simultaneously a control group of healthy fishes were maintained under identical conditions. The fishes were sacrificed at the end of exposure period and liver and muscle were processed for the biochemical estimation. Protein was estimated by the method of Lowry's<sup>9</sup> and amino acid was estimated by the method of Moor and Stein<sup>10</sup>.

**RESULT**

The protein contents in the liver and muscle of the freshwater fish *Ophiocephalus orientalis* exposed to sublethal concentration of cypermethrin at different time intervals and it showed declined trend as compare to control values. Due to toxic effect of cypermethrin, the process of protein synthesis get altered and an increase in proteolysis activity and possible utilization of its products for metabolic purposes. The amino acid contents in the liver and muscle of the freshwater fish *Ophiocephalus orientalis* exposed to sublethal concentration of cypermethrin at different time intervals and it showed raised trend as compare to control value. Rised in amino acid level were the result of breakdown of protein for energy and impaired in association of amino acid in protein synthesis.

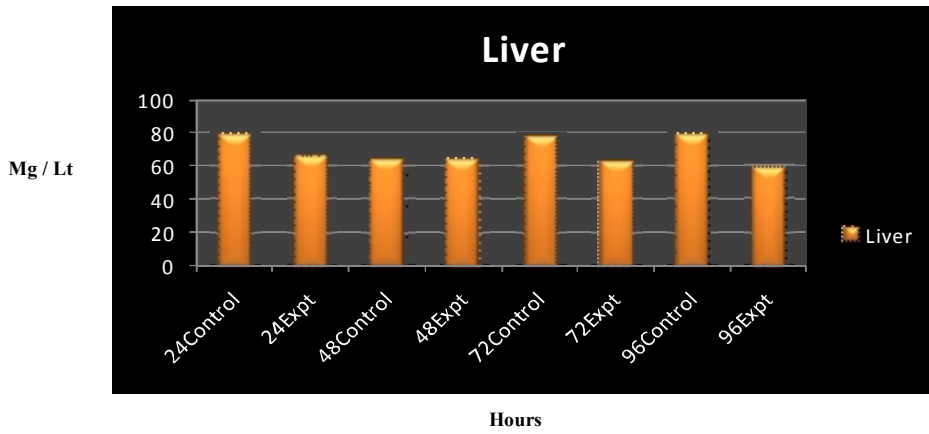


Figure 1: Changed in liver, protein of fish *Ophiocephalus orientalis* exposed to sub lethal concentration of cypermethrin at different time interval

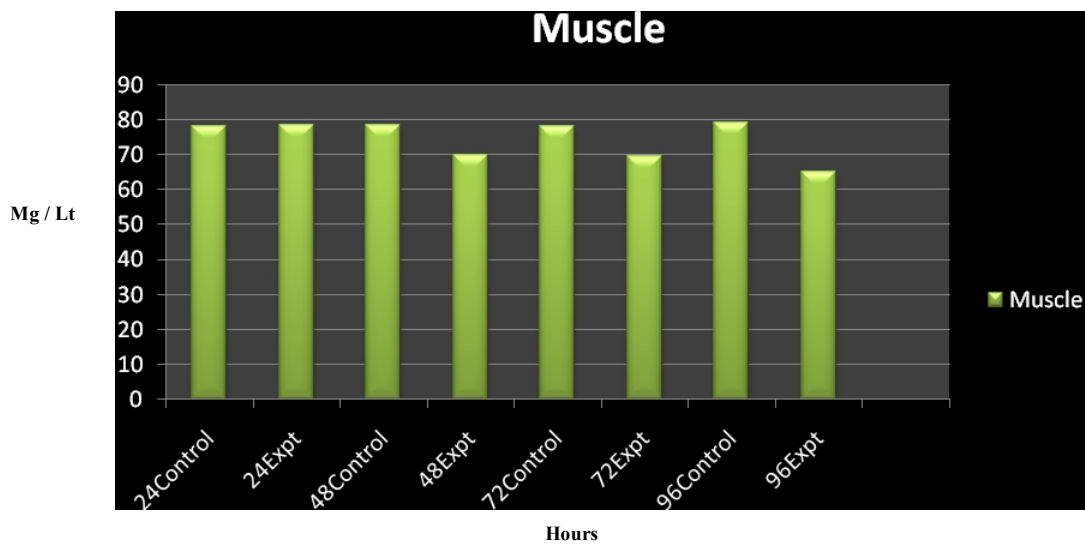


Figure 2: Changes in the Muscles, protein of fish *Ophiocephalus orientalis* exposed to sub lethal concentration of cypermethrin at different time interval

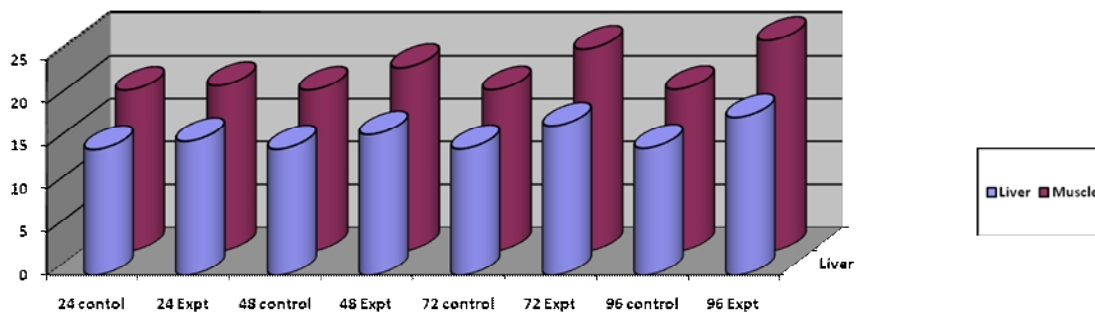


Figure 3: Changed in the Liver and muscle amino acid of the freshwater fish *Ophiocephalus orientalis* exposed to sublethal concentration of cypermethrin at different time interval

## DISCUSSION

In the present study observed that there was significant decrease in total protein of muscle and liver tissues of freshwater fish *Ophiocephalus orientalis* at different time interval exposed to sublethal concentration of cypermethrin. The similar study is given by the<sup>11</sup> on the fresh water fish *Channa striatus* and found that there was toxic effect of cypermethrin on the liver and muscle protein level it decreases at different exposure period.

Also supported by<sup>12</sup>, observed that there was effect of cypermethrin on protein content of rainbow trout *Oncorhynchus mykiss*. The depletion of protein fraction in liver, muscle and kidney may have been due to their degradation and possible utilization for metabolic processes. Similar results were also found by<sup>13-17</sup>.

The protein level showed decreased trend in Nile Tilapia, *Oreochromis niloticus*, in response to the treatment of cypermethrin by<sup>18</sup>. In *Clarias gariepinus* exposed to cyhalothrin decreased protein observed by<sup>19</sup>, in common carp, *Cyprinus carpio* by<sup>20,21</sup>; observed the decreased in protein level of due to effect of cypermethrin in freshwater teleost *Colisa fasciatus*. Also the increase in the amino acid level was observed under the toxic effect of a synthetic pyrethroid, cypermethrin exposed to freshwater fish *Ophiocephalus orientalis*.

Amino acids are considered one of the most reliable techniques for the detection of changes in protein synthesis in cell and therefore, the protein pattern can be used as a criterion for the differentiation between several organs exposed to some pollutants.

The similar study was also given by<sup>22</sup>, on the freshwater fish *Cirrhinus mrigala*. The toxic effect of cypermethrin also showed increased trend in *Cirrhinus mrigala*<sup>23</sup>, observed that there was increase in the amino acid level in the tissues of *Labeo rohita* and *Cirrhinus mrigala* exposed to fenvelerate. Similar increase of amino acid in *Labeo rohita* exposed to endosulfan was observed by<sup>24</sup>.

The freshwater fish *Clarias batrachus* exposed to cypermethrin, showed increase level of amino acid in muscle and kidney of fish<sup>25,26</sup>, observed that piscicidal activities of aqueous extract of *Euphorbia tirucalli* on freshwater fish *Channa punctatus* were altered the level of amino acid.<sup>27</sup> reported the effect of cypermethrin on gill, liver and muscle of freshwater fish *Tilapia mossambica* that increase in amino acid.

Similar study was also given by<sup>28</sup>, observed that the increase in amino acid level in liver of *Channa marulius* when exposed to dimethoate and monocil.

Concluded that protein decreased because of more utilization due to pesticidal stress also which breakdown protein released amino acid in the tissue which was used in prolonged period.


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