International Journal of Academic Research and Development
ISSN: 2455-4197
Impact Factor: RJIF 5.22
www.academicsjournal.com
Volume 3; Issue 1; January 2018; Page No. 739-740

Impact of sub-lethal concentrations of Cypermethrin on Total Protein in Muscle of the Walking Catfish, *Clarias batrachus* (Lin. 1758)

[*1] Musrat Majeed, [2] Shalni Anand, [3] Rajendra Chauhan, [4] Showkat Hussain Rather
[1, 2] Dolphin PG Institute of Biomedical and Natural Sciences, Manduwala, Dehra Dun, Uttarakhand, India
[3] Govt. MLB College, Bhopal, Madhya Pradesh, India
[4] Department of Zoology & Applied Aquaculture, Barkatullah University, Bhopal, Madhya Pradesh, India

Abstract
Cypermethrin is synthetic pesticide and very toxic pollutant, accumulated in aquatic ecosystems. Present study was designed to investigate acute toxicity of Cypermethrin on Walking Catfish *Clarias batrachus*. The effect of Cypermethrin on total protein in muscle was estimated in Walking Catfish *C. batrachus*. Fishes were exposed to different sub-lethal concentration of Cypermethrin (0.07µl/lit) for 1 day, (0.014µl/lit) for 5 days and (0.007µl/lit) for 10 days time intervals. The total protein level was found to decrease as 0.106±0.04, 0.209±0.003 and 0.640±0.02 mg/gram in muscle tissues at different exposure period.

Keywords: cypermethrin, musle, protein, pesticide

Introduction
Cypermethrin is widely used as pesticide in agricultural field, extensively used to control the pest during agricultural practices. It is one among effective pyrethroid pesticides and its doe's effect similarly as that of other pyrethroids containing cyano-3-phenoxybenzyl group's effect fishes (Oros *et al.,* 2010) [2]. These pyrethroids block the sodium channels of nerves, thereby altering depolarization phase; besides, affecting the GABA receptors (Capel *et al.,* 2008) [11]. Chemicals utilized in agricultural practices including nitrogen containing compounds, most pesticides and broke down products runoff to different water bodies as a result of rain (Gupta and Sharma, 2016) [4]. Due to over and uncontrolled use of these hazardous pesticides, serious environmental problems, influencing structure and function of the ecosystem are nowadays very common (Chinni *et al.,* 2001) [1]. Pesticides do produce stress in metabolism of many aquatic and terrestrial species (Hancock *et al.,* 2008) [13]. Pesticide contamination affects every tropic level in aquatic ecosystem including invertebrate (Castillo *et al.,* 2006) and non target aquatic fauna including fishes. In addition to their acute toxicity, pyrethroids have potentially hazards effect even at sub-lethal levels (Gupta and Sharma, 2016) [4].
Common use of these pesticides in agricultural practices or mosquito control means that some inevitable enter aquatic ecosystems. It is necessary to know the effects of these life hazardous pesticides on aquatic organisms (Elliott, 1977) [8]. Synthetic pyrethroids are utilized at alarming rate not only because of their efficacy but also due to their relatively faster biodegradability and low mammalian toxicity (Khan, 1983) [9]. Pyrethroids cause significant morphological and behavioral alterations in fishes. Scientist has shown that insecticides mainly affect liver of fishes, as livers serves as main detoxifying organ with the body.
Alteration that can be easily observed are declined trend in liver and intestine glycogen of *Ophiocephalus punctatus* exposed to sub-lethal concentration of Cypermethrin, these declined values of glycogen showed disturb carbohydrate metabolism due to toxic stress (Coats *et al.,* 1989). Proteins represent one of the main sources of energy which also plays an important role in tissue building. Since, fishes catch from natural water bodies are mostly used as a food item; hence an attempt has been made to study the changes, in the total protein of the Walking Catfish *Clarias batrachus* exposed to various sub-lethal concentration of Cypermethrin.

Materials and methods
The fishes were collected from local market of Gharwal District. Fishes were acclimatized in laboratory condition, for 10 days fed with artificial feed on daily basis and procedure for toxicity was done. After that fishes were exposed to sub-lethal concentration of cypermethrim (0.07 µl/lit) at 24, 48, 72, and 96 hours. The fishes were scarified and fresh muscle was isolated and total protein was estimated by the protocol of Lowry *et al.,* 1951.

Observations and discussion
In the present study observed that there was significant decrease in total protein of muscle and liver tissues of tested fishes at different exposure period. The value was found to be 0.106±0.04, 0.209±0.003 and 0.640±0.02 mg/g in muscle respectively as compared to control (0.827mg/g). A significant decrease was observed in total muscle protein, because muscles are very often used for various metabolic activities and performs all these activities at the cost of energy. Further, addition of these chemicals enhances muscular activity which may probably contribute to break down of muscle protein.

Table 1: Variation in total protein of walking catfish, *Clarais batrachyus* exposed to sub lethal concentration of Cypermethrin (0.00078 µl/lit).

Tissue	Exposure period (days)			
	Control	1	5	10
Muscle protein	0.827 mg/g	0.106±0.04 mg/g	0.209±0.003 mg/g	0.640±0.02 mg/g

Earlier investigations suggest that proteins are the main source of energy, thus breakdown is to overcome the high energy demand augmented during malathion stress in *Cyprinus carpio* (Malla, 1987) [12]. Also the total protein level showed decreased trend in Nile Tilapia (*Oreochromis niloticus*) and *Channa punctatus* in response to the treatment of Cypermethrin (Gupta and Sharma, 2016) [4]. Cyhalothrin exposure to *Clarias gariepinus* results decreased protein value in muscles (Kumble and Muley, 2000) [3]. David *et al.*, 2004 concluded that Cypermethrin effect includes decrease in protein level because of impaired synthetic machinery.

Conclusion

From present study, it can be concluded that Cypermethrin is highly toxic and affects total protein in muscles walking catfish, *Clarias batrachus.* This toxin further induces alteration in metabolism of these ecologically and economically important fishes.

Acknowledgement

The correspondent author gratefully acknowledges Head of Department, Dolphin PG Institute of Biomedical and Natural Sciences, Dehra Dun, for providing laboratory assets and Dr. Showkat Hussain, Faculty Member Department of Zoology and Applied Aquaculture, Barkatullah University, Bhopal for providing me valuable suggestion during the preparation of the manuscript.

References

1. Chinni CS, Khan RN, Yallapragada PR. Larval growth in post larval of *Penacus indicus* on exposure to Lead. *Bull Environ Contam. Toxicol*., 2001; 67:24-34.
2. Oros DR, Hoover D, Rodigari F, Crane D, Saricano J. Levels and distribution of polybrominated diphenyl ethers in water, surface sediments and bivalves from the San Francisco Estuary. *Environ. Sci*. *Tech*., 2010; 39:33-41.
3. Kumble GB, Muley DV. Effect of acute exposure of endosulfan and chloropyrifos on the biochemical composition of freshwater fish *Sarotherodon mossambicus*. Indian J Environ. Sci., 2000; 4:97-102.
4. Gupta, Sharma B. Cypermethrin impact on total protein in muscle and liver of the freshwater fish *Channa punctatus:* Int. J Adv. Chem. Eng., & Boil. Sci. 2016; 3(2):222-224.
5. Coats JR, Symonik DM, Bradbury SP, Dyer SD, Timson LK, Atchison. Toxicology of synthetic pyrethroids in aquatic organism. An overview *Environ Toxicol,* Chem. 1989; (8):671-679.
6. Castillo LE, Martinez E, Ruepert C, Savage C, Gilek M, Pinnock M, Solis E. Water quality and microinvertebrate community response following pesticide applications in a banana plantation *Limon costa Rica.* Science. Total Environ, 2006; 367:418-432.
7. David M, Mushigeri SB, Shivakumari R, Philip GH. Response of *Cyprinus carpio* (Linn) to sublethal concentration of cypermethrin Alteration in protein metabolic profile. Chemosphere. 2004; 56(4):347-352.
8. Elliott M. *Synthetic Pyrethroids*. American Chemical Society. Washington, 1977, 1-28.
9. NY Khan. An assessment of the hazard of synthetic pyrethroid, insecticides to fish and fish habitat. In: *Pesticide Chemistry;* Human Walfare and the Environment eds. J Miyamoto and P.C. Kearney, 1983; 3:437-450.
10. Lowry OH, Rosenburough NJ, Farn AL, Randall R. Protein measurement with Folin Phenol reagent. J Biol. Chem., 1951; 193:265-275.
11. Capel PD, Mccarthy KA, Barbash JE. National, holistic, water-shed approach to understand the sources, transport ans fate of agricultural chemicals. J of environmental quality, 2008; 37:983-993.
12. Malla PR. Modulation in protein profiles of white muscles of *Cyprinus carpio* under malathion stress. Biomed, 1987; 7:12-24.
13. Hancock TC, Sandstrom MV, Vogel JR, Webb RMT, Bayless ER, Barbash JE. Pesticides fate and transport throughout unsaturated zones in five agricultural settings, USA; J of environ. Qual., 2008; 37:1086-1100.