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ORIGINAL RESEARCH ARTICLE

Haematological Changes in the Fresh Water Catfish *Mystus vittatus* Exposed to Sublethal Concentrations of Monocrotophos.

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ABSTRACT

Effect of sublethal concentrations of Monocrotophos (4.5 ppm, 6.7 ppm and 13.5 ppm) on haematological parameters were studied in fresh water catfish *Mystus vittatus*. Monocrotophos toxicity resulted in a significant decrease in all the sub lethal concentrations and maximum at 13.5 ppm (RBC (-47), Hemoglobin content (-77), ESR(-75) and PCV % (-68) and a significant increase in WBC count (+55).

Key words: Monocrotophos, Sub lethal toxicity, Parts per million (ppm), Hematology, Catfish.

INTRODUCTION

In developing countries, an extensive use of pesticides to meet with increased agricultural needs is inevitable and the indiscriminate use and misuse of pesticides results in acute poisoning of the biosystems. Long term exposure to such pesticides is known to adversely affect number of vital functions not only in human but also in aquatic animals [1-4]. The impact of pesticides on haematological abnormalities in fresh water fishes have been adequately reported [5-7]. Monocrotophos an Organophosphate, Cholinesterase inhibitor and broad spectrum water soluble pesticide [8] and reports on their effects on haematological aspects are meagre. Hence the present communication deals with the effect of sub lethal concentrations of Monocrotophos, on various haematological parameters of *Mystus vittatus*.

MATERIALS AND METHODS

Test animal and Test chemical

The test fish *Mystus vittatus* (8 ±2 cm in length and weight of 8 ±2.5 gms) were obtained from local fresh water lake and acclimated to laboratory conditions for 3 weeks. The pesticide, Monocrotophos (technical grade) was obtained from M/S EID Parry (India) Ltd, Chennai and toxicity studies were conducted under static bioassay system [9].

Determination of LC 50 value

The LC 50/96 hr value was determined by adopting Finneys Probit method [10]. The three sublethal concentrations, 6.7 ppm, which is one tenth of the LC 50/96 hr value [11], 4.5 ppm and 13.5 ppm (less than and more than one tenth of LC 50 value) were chosen for experimentation.

Experimental Design

The control and experimental fishes were maintained for 30 days, to evaluate the long term effect of Monocrotophos. The medium was changed once in two days and no mortality of fishes were recorded during the period of investigation.

Collection of Blood and Hematological parameters

At the end of experimental period, blood was collected by severing the caudal ends of fishes and the different blood parameters were determined by the method of Dacie V, Lewis SM [12]. Blood cells were counted using Neubaur's Crystalline Counting Chamber. Haematic method. PCV and ESR were determined by Wintrobe's method (3000 rpm/hr) and Westergen's tube method.

Statistical Analysis

Student t-test was applied to find out it there in any significance difference between the control and treated groups for the various hematological parameters studied.

RESULTS

Significant changes were induced by the Monocrotophos toxicity in different hematological parameters of *Mystus vittatus* as shown in (**Table 1**). The haematological picture of control and Monocrotophos exposed fishes shows the

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following trend. The RBC ($x10^{6}/mm^{3}$) count decreased considerably from 2.26 (control) to 2.0 (4.5 ppm); 1.8 (6.7 ppm) and 1.2 (13.5 ppm) in treated groups respectively. The Hb content also showed a steady decline from the control to that of Monocrotophos exposed fishes. (Control – 0.86%; Treated groups: 0.6% (4.5 ppm) 0.4% (6.7 ppm) and 0.2 % (13.5 ppm). The ESR (Control 7.2% and treated groups 6 %, 3.2 % and 1.8%) and PCV % (Control 4.4% and treated groups 3.2%, 2.4% and 1.4%) also depicted a decreasing trend. Where as the WBC ($x10^{3}/mm^{3}$) showed an increasing trend from 40.62 (control) to 46.5 (4.5 ppm); 54.0 (6.7 ppm) and 62.8 (13.5 ppm) in treated groups.

Table 1: Haematological parameter of catfish *Mystus vittatus* exposed to Monocrotophos for a period of 30 days.

Hematological Parameter	Control	Treated		
		4.5ppm	6.7ppm	13.5ppm
Red Blood Corpuscles ($x10^{6}/mm^{3}$)	2.26±0.0571	2.0±0.3265* (-12)	1.8±0.4082** (-20)	1.2±0.4898*** (-47)
White Blood Corpuscles ($x10^{3}/mm^{3}$	40.62±0.3102	46.5±0.3265*** (+14)	54.0±0.4082*** (+33)	62.8±0.7348*** (+55)
Hb%	0.86±0.326	0.6±0.0816*** (-30)	0.4±0.653*** (-53)	0.2±0.0326*** (-77)
E SR%	7.2±0.2449	6.0±03265*** (-17)	3.2±0.2449*** (-56)	1.8±0.1632*** (-75)
PCV%	4.4±0.3265	3.2±0.2449*** (-27)	2.4±0.3265*** (-45)	1.4±0.1632*** (-68)

Values are expressed in Mean ± SD for 5 observations; Numbers in at paranthesis represent the percentage change from control value. Significant at $p<0.001$ ***, $p<0.01$ **, $p<0.05$ *

DISCUSSION

Pesticides are known to alter the blood parameters of fishes. A significant decrease in RBC, Hb content, ESR and PCV has been observed earlier in fishes exposed to different pesticides [13-17]. The findings of the present investigation also reveal a similar decreasing trend in all the parameters such as RBC, Hb content, ESR% and PCV% suggesting that the Organiphosphorous pesticides also induce changes which give evidence for decrease haematopoiesis followed by anemia induction in test fishes [18].

The decreased erythrocyte count and haemoglobin content observed in this study may be due to the disruptive action on the erythropoietic tissue, which in turn affected the cell viability. The increase in WBC count can be correlated with an increase in antibody production, which helps in survival and recovery of the fishes exposed to the toxicant [19]. A significant increase in WBC count in the present study indicate a hypersensitivity of leucocytes to monocrotophos and these changes may be due to immunological reactions to produce antibodies to cope up with stress induced by Monocrotophos.

Under the light of this toxicity study, it is concluded that exposure to sub lethal concentrations of Monocrotophos results in a significant alterations in different haematological parameters and this kind of physiological changes may directly affect the survivability of these fishes in their natural habitat.

REFERENCE

1. Nair KS, Paulmurugan R, Wilsanand V. Genotoxic effects of commonly used pesticide of south India in human lymphocytes. *Pollution research*. 2005, 24(1): 7-12.
2. Hazarika R. Effect of occupational exposure of perticides on health of farmer of the agricultural field of sorbhug area of lower Assam. *Nature environment and Pollution technology* 2011, 10 (2):237-241.
3. Subhadra B, Shelley B. Histopathological changes induced by chromic non lethal levels of elsan, mercury and ammonia in the liver of *Channa punctatus* (Bloch). *Journal of Environmental Biology*. 1997, 18 (2):141-148
4. Koundinya P, Ramamurthy R. Haemotological studies in *Sarotherodon (Tilapia) mossambicus (Peters*) exposed to lethal (LC50/48h) conc. of Sumithion & Sevin. *Current science*, 1979, 48 (19):877-879.
5. Sekhar P, Christy I. Haematological change in the fresh water catfish *Mystus vittatus* exposed to sublethal concentration of phosphamidon. *Journal of Ecobiology*. 1996, 8(1) 25-28.

6. Goel KA, Maya. Haematological anomalies in *Clarias batrachus* under the stress of rogor. *Advan Biosphere*. 1986, 5(11):187-192.
7. Malla FA, Sharma G, Singh S. Chloropyrifos pesticide toxicity on erythrocyte sedimentation rate in fish, *Channa punctatus* (Bloch). *Biol & Medi*, 2009, 1(2): 54-55.
8. Skripsky T, Loosli R. Toxicology of Monocrotophos. *Review of Envir Contamination & Toxicol*. 1994, 139:13-39.
9. Doudoroff PBG, Anderson GE, Burdick PS, Galtsaft WB, Harn M. Bioassay methods for the evaluation of acute toxicity of industrial wastes to fish. *Sewage Industrial Waste*, 1957, 23:1380-1397.
10. Finney DJ. Probit analysis Cambridge press. London. 1964.
11. Kirubakaran P. Endocrine and neuroendocrine physiology of the cat fish *Clarius batrachus* in relation to mercury treatment. Ph.D thesis, Centre of Advanced study in Zoology, B.H.U. Varanasi, 1989. P-60.
12. Dacie V, Lewis SM. In: practical haematology, ELBS, Longman, Singapore publishers.1975.
13. Palanisamy P, Sasikala G, Mallikaraj D, Bhuvaneshwari N, Natarajan GM. Haematological changes of fresh water food fish, *Channa striata* on exposure to *Cleistanthus collinus* suicidal plant extract. *Res J Pharm, Biol &Chemi sci*. 2011; 2(2): 814-816.
14. Sambasiva Rao KR, Prasad rao KS, Ahmed sahib KK, Ramana Rao KV. Combined action of carbaryl and phenthoate on fresh water fish *Channa punctatus* (Bloch). *Ecotoxi Environ Safety*. 1985, 10:209-217.
15. Bakthavathsalam R. Haematology of the fish *Anabas testudineus* exposed to lindane and carbofuran at submerged condition and on exposure to air. *Environ Ecology*, 1991, 9(1):124-127.
16. Nath R, Jaipuryar ARK. Effect of sub lethal concentration of lindane on peripheral hemogram in the fish *Heteropneustes fossilis* (Bloch). *Environ Ecology*, 1996, 14(1):158-162.
17. Park JH, Cho KS, Lee WH, Cho YJ, Yeon IJ. Change of acute toxicity and hematological parameters of *Pseudobagrus fulvidraco* to lindane. *Environ Eng Res*. 2004, 9(4):154-159.
18. Seth N, Saxena KK. Hematological responses in a freshwater fish *Channa punctatus* due to fenvalerate. *Bull Environ Contam Toxicol*. 2003, 71(6): 1192-1199.
19. Ramesh M, Saravanan M. Haematological and biochemical responses in a freshwater fish Cyprinus carpio exposed to chorpyrifos. *Int J Integrative Bio*. 2008, 3(1):80-83.