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Effect of Pesticide on Fish Health and Alteration in Leucocytes Due to Toxaphene Toxicity in *Notopterus Notopterus*

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Abstract

In the present investigation, toxaphene induced alteration in leucocytes have been worked out. It has been noted that thrombocyte population increased at P<0.001 at all the concentrations while lymphocyte decreased at P<0.05. A number of changes like thrombocytopenia and lymphopenia have been observed in toxaphene exposed Notopterus Notopterus.

Keywords: *Toxaphene, Leucocyte, Lymphocyte, Monocyte, Thrombocytopenia, Neutropenia, Notopterunotopteruss.*

Introduction

Potentially hazardous xenobiotic substance regarded as foreign substances to the body, confront aquatic life the sphere of their activity. They may be either selective toxic or display rather a broad spectrum of biological effects. The category of special concern is the pesticides. A review of literature revealed that a lot of work has been carried out on the toxicity of pesticides on different system of fishes, but information on hematological parameters especially on leucocyte population is meagre. Therefore the present study was undertaken to evaluate the effect of toxaphene (chlorinated camphene) on the leucocyte population presented in the blood of *Notopterunotopterus.*

Materials and Methods

Notopterunotopterus of the length of 16 cm $\pm$ 6 cm and weight 100 gm to 125 gm were procured from fresh water resources of the district. The toxaphenes commercially used by agriculturists was procured from pesticides shop of Muzaffarnagar.

A batch of 10 fishes each, after normal process of acclimatization and washing with 0.01 mg /l KmnO4 solution, were transferred into different aquaria containing different concentrations (0.05, 0.10 and 0.20 mg/l)of toxaphene . The pesticides solutions were prepared by adopting the dilution techniques (APHA et al., 1980). To avoid the effect of starvation, fishes were fed with chilled crustacean balanced diet. The water in all the aquaria was renewed after 2 days intervals. After 2, 4, 6 and 8 days of treatment, the blood smears were prepared by taking blood directly from caudal peduncle of the fish. The smears were stained with Leishman stain n. Differential Leucocyte counts were studied by using Towar binocular microscope. The different types of WBCs were identified as per the method of Blaxhall and Daisley (1973). The thrombocytes different WBCs like basophels, eoseinophlil, small and large lymphocytes, neutrophils and monocyte were counted and expressed as percentage.

Results

The differential WBC count for the control as well as in toxaphene exposed fish *Notopterus Notopterus* were made and the values obtained are shown in Table 1. The population of thrombocytes in circulating blood increases in the toxaphene exposed group at the different concentration (0.05, 0.10 and 0.20 mg/l) at different time intervals i.e. 2, 4, 6 and 8 days. These increased were observed to be significant at most of the concentrations at $P < 0.05$, $P<0.01$ and $P< 0.001$ (Table 1). Other components like small and large lymphocyte, monocytes, neutrophils, and basophils are found to be altered at different concentrations either significantly/insignificantly at places.

Discussion

It has been reported in most of the higher vertebrates that several abnormalities arises in WBCs when exposed to xenobiotics (Friberg et al., 1986; Mellanby, 1987). Authors, in the present investigation, observed, number of changes in WBCs of *Notopterus Notopterus* on prolonged exposure to toxaphene. The thrombocyts increased significantly at different time intervals. This observation regarding the change in thrombocyte number is supported by the number of earlier findings of Srivastava and Misra (1979) and Srivastava and Agrawal (1979).The increase in thrombocyte population in *Notopterus Notoperus* could be due to the damage in lymphoid tissue by toxaphene. Small lymphocyte count was found to be decreased in toxapheneexposed *Notopterus Notopterus* and which was found similar to the findings reported by Sjobeck et al. (1984).Small lymphocytes were also reported to decrease in *Colisfasciatus* exposed to different xenobiotics (Srivastava and Agrawal, 1979; Srivastava and Misra, 1979). However, large lymphocytes increased with the decrease of small lymphocyte in *Notopterus Notopterus* showing the cytological shift between the large and small lymphocytes.Similar cytological shift has also been observed by Oshawa and Kawai (1981) in rat exposed to heavy metals.

Newmann and MacLean (1974) observed thrombocytopenia lymphocytopenia and increase in neturophils following the exposure of *Tautogolabrusasperses* to heavy metal. Similar observations have also been observed in the present investigation.

Neutrophil alterations at $P<0.001$, observed in the present investigation, is in agreement as observed and reported by Dick and Dixon (1985) in *Salmo gairdneri*.

Monocytes, however reduced in *Notopterus Notopterus* when exposed to different concentrations of toxaphene and thus supporting the earlier finding of Rao and Sarma (1982) as observed in a fish *Badis buchanani* following the exposure to $CdSO_4$. Thus, differential white blood cell response observed in the present investigation indicate thrombocytosis, and seems to be a secondary response induced by toxaphene stress.

Decrease in leucocytes have also been observed in *Notopterus Notopterus* at different concentration. This might be due to the stress of toxaphene inducing neutrophilia. Decreases in leucocytes (due to neutrophilia) have also been reported by Palmer *et al*. (1951) in turpentine injected rat after injecting cortisone and ACTH. Similarly, Weinreb (1958) has reported lymphopenia in rainbow trout – *Salmo gairdneri* after cortisone and ACTH administration. Gardner and Yevich (1970) also reported thrombocytopenia, lymphocytopenia and neutropenia in fishes exposed to heavy metals.

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Table 1: Differential Leucocyte count in Notopterus notopterus exposed with different concentrations of Toxaphene.

Exposure Period (Day)	Toxicant Conccen-tration (mg/l)	Differential leucocyte counts (%)						
		Agranulocytes				Granulocytes		
		Thrombocytes	Lymphocytes		Monocytes	Neutrophils	Eosinophils	Basophils
			Large	Small				
2 days	Control	42.5 ± 0.3	22.1 ± 0.3	19.4 ± 0.3	1.0 ± 0.08	25.8 ± 0.5	8.6 ± 0.2	0.6 ± 0.02
	0.05	46.0 ± 0.4**	20.1 ± 0.6*	20.0 ± 0.5	1.5 ± 0.09	23.1 ± 0.6*	8.8 ± 0.3*	0.5 ± 0.02*
	0.10	49.5 ± 0.8**	18.5 ± 0.4*	19.9 ± 0.6	—	19.8 ± 0.3***	8.5 ± 0.1	0.8 ± 0.02
	0.20	50.1 ± 0.9**	19.3 ± 0.8	22.1 ± 0.4**	—	15.1 ± 0.4***	8.9 ± 0.2	0.5 ± 0.01*
4 days	Control	42.1 ± 1.2	12.3 ± 0.1	19.6 ± 0.6	0.7 ± 0.07	25.6 ± 0.4	8.8 ± 0.1**	1.0 ± 0.02
	0.05	52.3 ± 1.3**	8.7 ± 0.2***	20.8 ± 0.8	0.7 ± 0.08	18.7 ± 0.2***	8.5 ± 0.3	0.5 ± 0.03***
	0.10	57.3 ± 1.1***	6.3 ± 0.4***	21.3 ± 0.9	0.5 ± 0.06	15.6 ± 0.2***	8.3 ± 0.2**	0.7 ± 0.01***
	0.20	50.6 ± 1.6***	6.1 ± 0.1***	23.9 ± 1.1	—	10.8 ± 0.1***	8.6 ± 0.4	—
6 days	Control	35.8 ± 0.8	21.6 ± 0.3	14.2 ± 0.4	1.8 ± 0.08*	19.1 ± 0.4	5.5 ± 0.03**	2.0 ± 0.04
	0.05	36.5 ± 1.1	19.1 ± 0.4**	19.7 ± 0.08**	2.5 ± 0.09	15.6 ± 03**	3.4 ± 0.01***	3.2 ± 0.03***
	0.10	39.9 ± 1.2**	19.8 ± 0.3*	20.1 ± 0.2***	1.3 ± 0.07*	11.3 ± 0.2***	3.6 ± 0.04***	4.0 ± 0.05***
	0.20	41.2 ± 1.0*	18.6 ± 0.2**	21.0 ± 0.3***	1.2 ± 0.09	10.2 ± 0.2***	3.5 ± 0.03***	4.3 ± 0.04***
8 days	Control	35.8 ± 0.9	20.1 ± 0.3	15.5 ± 0.5	1.9 ± 0.08	19.3 ± 0.1	3.6 ± 0.02	3.8 ± 0.02
	0.05	40.1 ± 0.8*	19.4 ± 0.2	17.8 ± 0.3**	0.6 ± 0.08	11.6 ± 0.3***	3.3 ± 0.04**	5.2 ± 0.04***
	0.10	49.8 ± 1.1***	12.6 ± 0.1***	15.8 ± 0.2	1.0 ± 0.09*	13.1 ± 0.2***	3.5 ± 0.05	4.2 ± 0.05**
	0.20	50.7 ± 1.6***	11.8 ± 0.2***	18.4 ± 0.2**	1.5 ± 0.05**	9.0 ± 0.1***	3.0 ± 0.06***	4.6 ± 0.06***

Values are the mean ± S.E. (8 observations), Values are statistical significant at *P < 0.05; **P<0.001; ***P < 0.001.

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