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EFFECTS OF DIMETHOATE & CYPERMETHRIN EXPOSURES ON THE PROTEIN CONTENTS IN BLOOD (SERUM) & TISSUE OF ANABAS TESTUDINEUS EXPOSED TO LETHAL & SUBLETHAL CONCENTRATION.

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ABSTRACT:-

The total protein content in the blood , liver , muscle , kidney & gonads of the fish exposed to different concentration of both dimethoate & cypermethrin showed a decreasing trend depended on concentrations of the pesticides & exposure period when compared with that of their respective normal value. This suggests an intensive proteolysis, which in turn could contribute to the increase of free amino acid to be fed in to TCA cycle as keto acid. The hypo-proteinemia as observed ,might be due to the damage of vital organs of the fish. And /or due to rapid demination of protein due to intoxication of the pesticides.

KEYWORDS:-

Anabas testudineus, Dimethoate, Cypermethrin ,Tissue ,Protein contents.

INTRODUCTION:-

The physiological significance of blood us to transport oxygen to the cell & remove CO_2 from there. Several workers have reported variation in the normal blood parameters and biological changes in some vital organs of fishes exposed to different pollutants including some pesticides koundinya & murthi ,1979 ,Bhakthavathsalam , 1987 et al contended that the changes produced by various pollutants superficially look alike , but their harmful effect on the different genera of fish is not of the same magnitude. A/C to passow et al (1961) toxic effect of pollutants may result from their binding with biological active constituents of the body such as protein , enzymes , amino acid.

Blood takes pant directly or indirectly in almost all the activities of vertebrates &fish cannot be an exception to it .The blood may be regarded as good indicator of stress condition. Pesticides are known to disturb protein level as it has been reported that

acute toxicity elicits hyperproteinamia. Shella & muniandy (1992) in L. Thermalis exposed to sublethal concentratration of dimethoate observed a decrease protein amino acid contents. Of muscle & liver. Fulton & key(2001) have reported that organophosphorus insecticides produces toxicity by inhibiting the cholinesterase enzymes in the nervous system & therefore monitoring of acecty lcholinesterase inhibition has been widely used in terrestrial & fresh water aquatic system as an indicator of organophosphorus exposure effects.

MATERIALS AND METHODS

Sufficient number of healthy specimens of Anabas testudineus of 30.0 ± 3.0gm weight groups were collected from the local market and acclimatized in the laboratory condition and placed in 8.46 , 6.04 , 3.62 & 1.21 mg/1 dimethoate and 47.30 , 33.78 , 20.27 & 6.76 µg/1 cypermethrin concentrations as done.

At selected hour of exposure i.e , 24 , 96 , 240 , 480 , 960 & 1440 hrs. Along with controls the fish were taken out from, each concentration and after blotting the trunk with filter paper , fresh blood samples were collected from caudal artery by severing the tail and /or by direct heart puncture without using anesthesia or any anticoagulant between 8:30 A.M to 10:30 A.M .thus five samples of pooled blood were prepared. Simultaneously , fish were dissected out and require amount of tissues i.e Liver , muscle , kidney ovary & testis were accurately measured in the nearest milligrams & kept in respective solutions for different biochemical tests.

OBSERVATION:-

Determination of total protein in blood & tissne showed in table -1.1 . The total protein content in the blood of the fish exposed to Lethal & sublethal concentrations of both Pesticides dimethoate & cypermethrin showed a gradual decrease which has been recorded statistically significant at 240 hr. Of exposure. Maximum decrease at 1440 hr. Of exposure.

LIVER PROTEIN :-

The liver protein content in the normal fish during dimethoate & cypermethrin experiment varied in between 75.80 ± 1.38 to 85.70 ± 2.10 mg/gm and in between 82.25 ± 1.52 to 86.25 ± 1.25mg/gm with average normal values of 81.22 ± 1.79 & 83.76 ± 1.57 mg/gm respectively.

MUSCLE PROTEIN:-

The muscle protein in the normal fish during dimethoate & cypermethrin experiment has been recorded to be 38.25 ± 1.26 to 40.35 ± 1.54 mg/gm and in between 38.25 ± 1.26 to 40.20 ± 1.12 mg/ gm with average normal value of 39.43 ± 1.49 & 39.25 ± 1.37 mg/gm respectively.

KIDNEY PROTEIN :-

The total protein content in the kidney of normal fish during dimethoate & cypermethrin varied in between 38.46± 1.38 to 40.25 ± 1.42 mg /gm and in between 36.90 ± 1.41 to 39.25 ± 1.34 mg /gm with average normal value of 39.36 ± 1.38 & 37.84 ± 1.31 mg /gm respectively.

OVARY PROTEIN :-

The protein content in the overy of normal fish during dimethoate & cypermethrin experiments varied in between 75.96 ± 2.10 to 86.46 ± 2.12 mg /gm and in between 75.20 ± 2.12 to 81.16 ± 2.26 mg/gm with average normal value of 79.81± 2.17 & 78.14 ± 2.00 mg/gm respectively.

TESTIS PROTEIN :-

The total protein in the testis of the normal fish exposed during dimethoate and cypermethrin concentration varied in between 66.50 2.18 to 72.48 2.14 mg /gm with average normal value of 69.75 2.12 & 69.62 1.93 mg/gm respectively.

A gradual decrease has been observed in the total protein contents.

RESULTS :-

In the present study a gradual & significant decrease in haemoglobin , haematocrit & erythrocyte number in the blood of A. Testudineus exposed. To different concentration of both pesticides , dimethoate & cypermethrin which were depended on the concentration & exposure periods. The decreased RBC & haemoglobin values may result hydrochromic microcytic anemia , which is attributed to difficiency of iron & their decreased utilization for haemoglobin and /or alternation of cell membranes by hydrolysis of acetylcholine in body fluid by cholinesterases of erythrocytes as suggested by Mcfarlane & Robb-smith (1961). The alteration of RBC number might also be due to toxicant induced effects of haemopoitic organs or due to shrinkage & less RBC formation of haemopoietic organs. However ,the MCH & MCHC values concentration of the pesticides & exposure period through a clear picture has not been obtained.

Blood protein & tissue protein especially liver and muscle protein , representing energy reserves of the fish may be used as reliable tools to evaluate the severity of intoxication. Keirmeir (1939) suggested that probable cause of a rise in blood protein level was asphyxiation. Miller (1958) has demonstrated that amino acid reserves of hatchery raised rainbow trout were exhausted rapidly following trarsportation & planting in streams , which was caused by increased body activities. Shiv kumara et al (1997) also observed impaired protein metabolism in heart , liver & kidney in cyprinus carpio exposed to sublethal concentrations cypermethrin.

DIsCUSSION:-

In the present study , the total protein content in the blood , liver , muscle , kidney & gonads (both testes & ovary) of the fish exposed to different concentrations of both dimethoate & cypermethrin showed a gradual deactive dependend on the concentration & exposure period , when compared with that of their normal values. This suggests an intensive proteolysis , which in turn could contribute to the increase of free amino acid to be fed in the TCA cycles as keto acid , thus supporting the hypothersis of kabeer et al (1981). This possibility is further strengthened by the earlier findings of shakoori et al (1976). Which revealed both quantitative & qualitative variations in the

tissue amino –acid of the fish exposed to toxicants. Further , Mukhopadhyaya and Deharai (1980) in clarias batrachus exposed to malathion have also reported a significant decrease in protein level of liver after incorporation of TCA cycle are involved in aerobic metabolism. Sornaraj et al. (1995) , suraj (1998) and Gupta (2003) have also reported decrease in the activities of some enzymes and total protein content in blood , liver , muscle & gills of the toxicant induced fishes. Thus the hypoproteinemia as observed during present study might be due to the damage of vital organs of the fish body and /or due to rapid domination of protein due to intoxication of dimethoate and cypermethrin.

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TABLE -1;

Change in Blood & tissue total Protein contents of Anabas testudineus exposed to lethal & sublethal concentration of pesticides

		Serum total protein		Liver protein		Muscle Protein		Kidney Protein		Ovary Protein		Testis Protein	
		(gm/dl)	% Change	Mg/gm	% Chang	Mg/gm	% Chang	Mg/gm	% Chang	Mg/gm	% Chang	Mg/gm	% Chang
control	24 hr	4.80± 0.21		86.25 ± 1.25		39.25± 1.74		37.58± 1.26		78.42 ± 1.50		66.50± 2.18	
47.30		4.58 ± 0.16	-4.98	82.40 ± 1.62	-1.62	38.32 ±1.39	-2.37	35.96± 1.37	-4.97	75.20 ± 2.12	-4.47	65.62± 2.23	-5.74
33.78		4.72± 0.18	-2.07	86.68± 1.54	3.49	40.10± 1.64	2.16	37.32 ±1.58	-1.37	74.65± 2.10	-2.09	68.24 ± 2.04	-1.97
20.27		4.80 ± 0.20	-0.41	86.28 ± 3.00	3.00	39.86 ± 1.55	1.55	37.75 ± 2.00	-0.24	76.5± 1.98	-1.13	68.05± 1.95	-2.25
6.76		4.86 ± 0.15	0.75	87.16 ± 1.71	4.06	40.34 ±1.32	2.78	36.52± 1.94	-3.49	77.26± 2.14	-0.18	68.00 ± 1.95	-2.33
control	96hr	4.95± 0.23		83.90± 1.52		38.68± 1.50		36.90 ± 1.41		78.00± 2.16		69.76 ± 2.00	
47.30		4.34 ± 0.18	-9.96	78.85± 1.90	-5.86	35.90± 1.62	-8.53	33.54 ± 1.50	-11.36	77.00 ± 2.10	-7.24	63.48 ± 2.24	-8.82
33.78		4.58 ± 0.21	-4.98	82.48 ± 1.67	-1.53	38.22± 1.41	-2.62	35.77± 1.76	-5.47	72.40± 2.18	-2.44	67.36± 2.10	-3.25
20.27		4.82± 0.23	0.00	85.23 ± 1.38	1.75	39.36± 1.27	0.28	36.32± 2.00	-4.02	76.23± 2.04	-0.50	65.94 ± 2.24	-5.28
6.76		4.85± 0.20	0.62	85.74 ± 1.95	2.36	40.00± 1.34	1.91	37.08± 2.10	-2.00	77.75 ± 2.00	-0.08	66.75 ± 1.96	-4.12
control	240hr	4.72± 0.19		84.56 ± 1.66		38.25 ± 1.26		37.87 ± 1.38		78.20± 2.29		70.34 ± 1.71	
47.30		3.90± 0.14	-19.09	73.82 ± 1.58	-11.87	29.58 ± 1.31	-24.64	31.40 ± 1.10	-17.02	76.45 ± 1.92	-12.21	54.30± 2.04	-14.82
33.78		4.36± 0.21	-9.54	79.28± 1.66	-5.35	35.76± 1.40	-8.89	34.00 ± 1.29	-10.15	68.50± 1.96	-3.95	65.08± 2.10	-6.52
20.27		4.42 ± 0.24	-8.30	83.10 ± 1.15	-0.19	37.90± 1.28	-3.44	35.76 ±1.41	-5.5	75.05± 1.84	-2.79	65.46± 2.10	-5.91
6.76		4.54 ± 0.19	-5.81	84.87 ± 1.74	1.32	38.95± 1.41	-0.76	36.23± 1.37	-4.25	75.96 ± 2.05	-1.71	66.02± 2.41	-5.17
control	480hr	4.88 ± 0.14		82.25 ± 1.52		39.76 ± 1.23		37.18± 1.22		76.80 ± 2.16		68.10± 2.08	
47.30													
33.78		4.19 ± 0.18	-13.70	77.46 ± 1.46	-7.52	34.60± 1.42	-11.85	32.96 ± 1.33	-12.90	73.60 ± 2.04	-5.81	63.78 ± 2.12	-8.39
20.27		4.36 ± 0.16	-9.54	80.10± 1.85	-4.37	36.38 ± 1.30	-7.31	34.25± 1.47	-9.49	74.25 ± 2.32	-4.98	64.42 ± 2.16	-7.47
6.76		4.42± 0.15	-8.30	80.96± 1.62	-3.34	37.76± 1.36	-3.80	34.10 ± 1.60	-9.88	74.76± 1.98	-4.32	64.96 ± 2.09	-6.69
control	960hr	4.75± 0.19		83.10± 1.44		40.20 ± 1.12		39.25± 1.34		80.60 ± 2.12		72.48± 2.14	
47.30													
33.78		4.06 ± 0.12	-15.77	74.22± 1.76	-11.39	32.96± 1.23	-16.02	32.18 ± 1.46	-14.96	68.75± 1.88	-12.02	60.95 ± 2.01	-12.45
20.27		4.28 ± 0.18	-11.20	76.40 ± 1.51	-8.79	34.00± 1.42	-13.37	33.34 ± 1.30	-11.89	72.48 ± 2.10	-7.24	63.80 ± 1.96	-8.36
6.76		4.35 ± 0.13	-9.75	77.05 ± 1.85	-8.01	34.72 ± 1.28	-11.54	33.87± 1.41	-10.49	73.00 ± 1.79	-6.58	64.26 ± 1.78	-7.70
control	1440hr	4.84 ± 0.21		82.48 ± 2.00		39.36± 1.40		38.46 ± 1.28		81.16 ± 2.26		70.54 ± 1.47	
47.30													

33.78		3.38± 0.12	-29.87	69.36± 1.68	-17.19	28.38 ± 1.18	-27.69	30.65± 1.32	-19.00	64.92 ± 1.94	-16.92	57.70 ± 1.45	-17.12
20.27		3.96± 0.16	-17.84	71.22 ± 1.54	-12.58	31.90 ± 1.26	-18.73	31.40 ± 1.18	-17.02	69.64 ± 1.69	-10.88	60.25 ± 1.18	-13.40
6.76		4.14 ± 0.13	-14.11	73.90± 1.57	-11.77	32.46± 1.45	-17.30	31.78± 1.21	-16.01	7038 ± 2.02	-9.93	61.57± 1.36	-11.56
Over all average of control fish													
		4.82± 0.19		83.76 ± 1.57		39.25± 1.37		37.84± 1.31		78.14± 2.00		69.62 ± 1.93	