

ACUTE TOXICITY EVALUATION OF NUVAN IN LIVER
OF *CHANNA PUNCTATUS* (BLOCH.)

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ABSTRACT: Nuvan (DDVP) used organophosphate used in agriculture as insecticides the concept of green revolution is mainly based on chemical fertilizers and synthetic insecticides. Organophosphate (OP) insecticides today account for approximately 80% of registered synthetic insecticides. Nuvan has been taken for the acute toxicity to a fresh water fish channa punctatus LC50 value calculated for the acute toxicity, which was 0.024 ml/L. Biochemical study of liver Glycogen, Protein profile, Lipid profile, Glutamate pyruvate transminase (GPT), Glutamate oxaloacetate transminase (GOT), Alkaline phosphate (ALP and acid Phosphatase (ACP) after 24h, 48h, 72h and 96hour exposure to lethal toxicity of Nuvan. The observation is very important from biochemical point of view.

INTRODUCTION

Unprecedented growth in human population has posed a serious problem to fulfill the requirement of sufficient amount of food to every citizen of the country. The use of crop -protecting toxicants and pesticides now become a necessity of farmers. But when chemicals, fertilizers and pesticides, applied on the field, its effect on survival, growth, metabolism and reproduction on non targeted organism. The fish is a good indicator and highly sensitive in such ecosystem where the water gets contaminated to toxic chemicals. Nuvan belong to widely used organophosphorous group of insecticides, which is a broad group of pesticides. It hazardous chemical has been known to accumulate in fishes tissue and other edible organisms have a chance to reach the predators like birds and man through food chain. The present study is an attempt to estimate the acute toxicity of biochemical changes in liver of fresh water fish *Channa punctatus*.

MATERIALS AND METHODS

Fish *Channa punctatus* were collected from the local fish market of Agra, district (U.P.). The average length and weight of fish is 12-15 cm and 60-70 g respectively. They were kept in glass aquarium (75 x 37.5 x 37.5) capacity 25 liter, having non chlorinated tap water aquaria bath 1% KMnO₄ solution for disinfection. The fish were acclimatized for one week before examination. The water used for toxicity test contained 20-25°C and 7.2 pH during acclimations they were feed market food or egg yolk twice in a day .Feeding was stopped 24 hr before starting the experiment. Dead fish (If any) was removed from aquaria as soon as possible to avoid water fouling and water was changed after 2 or 3 days. Nuvan (DDVP) from Syngenta India Ltd. was use for present study. Five aquaria were set up for each concentration and each aquarium contained six fish in 25 L dechlorinated water. The data was analyzed statistically by log dose /probit regression line method, which were calculated 0.024ml/L. lethal dose applied for 24h, 48h, 72h and 96houe toxicity test. One control group of healthy fish was maintained simultaneously. The liver was removes from live fish from each group after completion of exposure time. The biochemical parameters estimated by, Glycogen ([Montgomery, 1957](#)), total protein ([Dumas et al., 1971](#)), total lipid ([Folch et al., 1957](#)), total cholesterol ([Wybenga et al., 1970](#)), high density lipoprotein ([Warnick et al., 1985](#)), low density

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lipoprotein ([FriedWald, 1972](#)), triglycerides ([McGowan et al., 1983](#)), Glutamate oxaloacetate transaminase and Glutamate pyruvate transaminase ([Reitman and Frankel, 1957](#)), alkaline phosphate ([Kind and King, 1954](#)) and acid phosphatase ([Kind and King, 1954](#)) methods respectively.

RESULTS AND DISCUSSION

The comparative data of the biochemical parameters of both and control and experimental fishes have been summarized in the Table (1). The result indicates that there is a significant decrease in the glycogen contents in liver as the concentration and exposure time increased.

Table 1: Biochemical parameters in liver of *Channa punctatus* after Nuvan intoxication

S. No.	Parameter (mg/g)	Control	24hour	48 hour	72 hour	96 hour
1.	Glycogen	3.8318	3.6767*	3.6065*	3.6047**	3.5347***
2.	Total protein	2.0541	2.1165*	2.4561*	2.1673**	1.6588***
3.	Albumin	0.8592	0.8270*	0.8700**	0.8020***	0.7681***
4.	Globulin	0.4955	0.4686*	0.4179*	0.3874***	0.3799***
5.	A/G ratio	0.1919	0.1914*	0.1086*	0.1948*	0.1775*
6.	Total lipid	3.380	3.7722*	3.0051*	3.7477**	2.0712***
7.	Total cholesterol	0.6373	0.5867**	0.4813***	0.4051***	0.4865***
8.	HDL	0.6480	0.6021*	0.6603***	1.1289***	1.5842***
9.	LDL	0.4525	0.8959*	0.7950***	0.7990***	0.8217***
10.	TG	0.7889	1.2113**	1.2292***	1.2040***	0.9793***
11.	VLDL	1.0159	1.1717*	1.1595**	1.2321***	0.9226***
12.	GOT	0.2162	0.3370***	0.2807***	0.2940***	0.3023***
13.	GPT	0.1121	0.1558*	0.1663*	0.1941***	0.2455***
14.	ALP	0.1303	0.2893***	0.3278***	0.3522***	0.2880***
15.	ACP	0.1996	0.1269**	0.1961***	0.0934***	0.0469***

S. Em. = Standard Error of Mean

*Non-significant (p<0.5)

** Significant (p<0.1)

*** Highly significant (p<0.01)

****Very highly significant (p<0.001)

It may be due to liver glycogen is reversibly convertible to glucose and maintain blood glucose level. It is supported by [Coppon and Nicholas, \(1975\)](#) that a fall in glycogen level in pesticide exposed animal indicates its rapid utilization to meet the enhanced energy demands through glycolysis or hexose monophosphate pathway. Similar observation has been seen by [Qayyum and Shaffi, \(1997\)](#) and [Ghosh, \(1987\)](#). [Tilak et al., \(2005\)](#) have also observation that decreases level of glycogen into glucose under different pesticide toxicity level. In protein profile, protein is a complex organic compound and is main component of every living cell and all body fluids except bile and urine. Albumin is a major component of protein and globulin is the protein that includes Gama globulins antibodies. In present investigation protein profile in liver tissues decrease with increase exposure span. The results supported by [Kumari and Kumar \(1996\)](#) and [Murthy and Devi, \(1982\)](#) that decrease liver protein in *Channa* species due to physiological stress urges for more energy requirement and [Tilak et al., \(2005\)](#) have reported the same result in *Cyprinus carpio* due to treatment of different pesticides. [Bhagyalakshmi et al., \(1983\)](#) analyzed the low level of protein in *L. thermalis* due to rapid utilization of energy under stress condition due to proteolytic activity. In a lipid profile, total lipids are broadly as any fat soluble, naturally occurring molecules, such as fats, oils steroids, fat soluble vitamins etc. Cholesterol is an unsaturated steroid alcohol of high molecular weight. Its mainly synthesized in the liver while the high density lipoprotein (HDL) are synthesized by both liver and intestine and low density lipoprotein is synthesized in the liver only. Very low density lipoprotein is triglyceride rich lipoproteins secreted by the liver and its main function is to distribute the triglyceride produce by the liver. In the present investigation observed liver tissues lipid profile decrease through the whole exposure periods. Present findings supported by [Awasthi, \(1982\)](#); [Murthy and Devi, \(1982\)](#) and [Rathore and Singh, \(2000\)](#). This lipid decreasing trends may be attributed to abnormalities in fat deposit cells of liver and also changes in lipid content may be due to inhibition up take of lipid compound by the tissue for utilizations of cellular level increase lipolysis of mitochondrial injury which impaired the function of citric acid toxic stress. [Jha, \(1999\)](#) supported the findings of the present study due to pesticide inhibited lipid synthesis and stored mobilizing the stored lipid molecules. [Singh et al., \(1992\)](#) and [Durairaj and Selvarajan, \(1992\)](#) also observed depletion of tissue lipid in *N. aureus* when exposed to synthetic pyrethroid, cypermethin due to stress condition. Alkaline Phosphate is an intracellular enzyme a protein that becomes elevated when there is distraction of cells. The key area where it is produced

is liver and bone. In present study the decrease alkaline phosphate level in liver tissue after Nuvan treatment has been observed in whole experiment period. Similarly findings have been supported by [Shobarani et al., \(2001\)](#) and [Ramesh et al., \(1994\)](#) decreased ALP level in fish muscles due to inhibition of ALP activity consecutive impairment of phosphorylation, in coupling might have also occurred while promotes the spilling of an enzyme rich intermediate compound prior to ATP production. [Pugazhendy et al., \(2007\)](#) in the liver of *Cyprinus carpio* decreased alkaline phosphates due to exposed to sub lethal concentration of toxic substance. [Sarasu et al., \(2004\)](#) reported decreased alkaline phosphate se in fresh water teleost *Hypophthalmichthys molitrix* and *Catla catla* due to effect of distillery effluent. Acid phosphatase is an important hydrolytic enzyme concerned with the process of transphosphorylation. In present study the acid phosphates (ACP) level in fish *Channa punctatus* has decreased after Nuvan intoxication. [Sastry and Siddiqui, \(1984\)](#) observed decreased activity of acid Phosphatase due to physiological function of the tissues, that enzymes activity was affected in catfish *H. fossilis* after exposed to toxic substance similar findings observed [Sarasu et al., \(2004\)](#) and [Pugazhendy et al., \(2007\)](#) observed decreased acid phosphatase due to uncoupling of phosphorylation after exposure of fenvalerate toxicity. Glutamate oxaloacetate transaminase (GOT) is an enzyme mostly found in liver and release at time of liver or muscles cell injured. In present investigation increase GOT level with increase exposure time. Similarly findings have been reported by [Shanthi and Dhanalakshmi, \(2006\)](#) due to sugar mill effluent that increase rate of proteolysis. Same findings reported [Shukla and Sastry, \(1998\)](#), [Heath, \(1987\)](#); [Bogin et al., \(1994\)](#) and [Atroshi et al., \(2000\)](#) due to chemical stress in fishes. Glutamate pyruvate transaminase (GPT) also show increased. Findings also supported to Dass and coworkers in fresh water edible fish *Labeo rohita* due to tissue damage or increase synthesis of aminotransferases by cypermethrin pesticide. [Atroshi et al., \(2000\)](#) due to stress in fishes. [Shanthi and Dhanalakshmi, \(2006\)](#) also reported increased enzyme synthesis in liver of fresh water fish *Cirrhinus mrigala* after exposure to sugar mill effluents due to increased rate of proteolysis.

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