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EFFECT OF DIAZINON ON THE ACTIVITY OF AMINO ACID IN GILLS AND KIDNEY OF CHANNA PUNCTATUS

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Abstract
The impact of pesticide like Diazinon was localized histochemically on the activities of amino acids (arginine and tryptophan) on gills and kidney of Channa punctatus. It has been observed that the pesticide has adverse effect on essential amino acids. Our experimental evidences may be useful in revealing the mechanism of injuries caused by this pesticide.

Key words: Kidney, Gills, Essential Amino Acid, Arginine and Tryptophan.

Introduction

The wide use of agricultural pesticides in discriminately has developed an ecological crisis due to environmental pollution. These pesticides residue are washed away by rain water into rivers. Most of the pesticides used have appreciated long life period and also quite stable. However, some of them undergo biodegradation on soil, water or in animals and plant bodies. Pesticides are highly toxic to the organism and poorly effected of organisms.

During the Second World War II introduction of DDT, a synthetic organic insecticide gave entirely a new concept in pest control. Now a day, a very large number of such insecticides belonging to different group like chlorinated hydrocarbon, organo-phosphorus compounds etc. are used. These pesticides are commonly used because of their broad-spectrum insecticidal efficiency and relative low cost. These pesticides provide a useful tool for agriculturalist and hygienist for crop protection and disease control. This chemical, if resistant in nature, prove to be still more hazardous both to plants and animals, especially in aquatic environment. The pesticide and their residue which are used in farming continuously discharge into environment, resulting to the imbalance of natural equilibrium and affect food chain. Because are part of food chain, keeping this in view the present investigation was undertaken to evaluate the impact of used pesticide on the amino acid of gills and kidney of *Channa* punctatus.

Very little work has done on effect of pesticide on amino acid in different tissues of fish body. The present study has been designed to understand the changes in arginine and tryptophan content (essential amino acid) in the gills and kidney of *Channa punctatus* when treated with Diazinon.

Material and Methods

Live specimen of *Channa punctatus* were collected from local agencies and were acclimatized to laboratory condition for 7 days. The fishes were divided in to two groups with 20 fishes each. The first group was kept in Diazinon solution of 3.1 mg/l. The second group served as control and was maintained under laboratory condition in ordinary tap water. The treatment was applied on fishes for one month. After one month the fishes were sacrificed one by one by decapitation. The tissues (Gills and Kidney) were removed carefully and fixed in 10% neutral formalin (as a fixative).

Paraffin sections were prepared and subjected to the following histochemical tests
1. The Sakaguchi reaction for arginine (Baker's modification 1947)[9].
2. DMAB nitrite method (Adam 1957)[3].

Results and Discussion
Arginine
Gills
In control fishes strong positive reaction is seen in gill raker, adductor muscle, abductor muscle and moderate activity is seen in remaining tissue.

After Diazinon treatment gill raker, adductor muscle and abductor muscle shows dull activity. Details are given in table 1.

Kidney
In control fishes strong reaction is seen in proximal convoluted tubules and distal convoluted tubules. Moderate activity is seen in glomerulii.

After Diazinon treatment dull & nil reaction is seen in all the tissue of kidney.Details are given in table 2.

Tryptophan
Gills
Presence of tryptophan was noticed in gill raker, adductor muscle and abductor muscle in strong reaction form but moderate reaction is seen in secondary gill lamellae and primary gill lamellae.

After Diazinon treatment gill raker, abductor muscle, secondary gill lamellae and primary gill lamellae shows nil activity and adductor muscle shows dull activity. Details are given in table 3.

Kidney
In the control fishes strong reaction is seen in proximal convoluted tubule and distal convoluted tubules. Moderate activity is seen in glomerulii and medullary region After diazinon treatment all the tissues shows dull and nil activity. Details are given in table 4.

The amino acids are essential compounds for all living cells as building blocks of protein. All the amino acid in biological system can be broadly distinguished as (1) essential amino acids are those which cannot be synthesized by living body and hence are essential to be supplied with diet, and (2) non-essential amino acids are those to which the body is able to synthesize from basic ingredients and hence not essential to be present in diet. In the present study one essential amino acid, the arginine and other is tryptophan has been taken for histochemical investigation. Arginine, a constituent of most proteins, is the most common positively reacting substance in this test. A red color is produced when arginine reacts with α-naphthol and sodium hypochlorite or sodium hypobromite in an alkaline solution. Tryptophan (α-amino-indole-3-propionic acid) was named by Neumeister for an unidentified substance found in the tryptic hydrolysate of proteins that produced a red color with chlorinated water—a reaction characteristic of indole compounds[10,16,21]. The name "tryptophan" (formerly "tryptophane") is now generally accepted. Tryptophan is a common constituent of most proteins, although usually present in small amounts. In the present study, the p-dimethylaminobenzaldehyde

(DMAB)–nitrite method has been used for the histochemical detection of tryptophan. In this reaction, tryptophan and related indolyl derivatives condense with p-dimethylaminobenzaldehyde to form a colorless intermediate, which develops a strong blue pigment upon oxidation with nitrous acid (nitrite)[3.16]. The present study provides information on the histochemical localization of the amino acids arginine and tryptophan. The diazinon pesticide has adverse effect on amino acid present in gills and kidney of *Channa punctatus*. Because of the limited availability of data and literature on amino acid localization, no meaningful comparison could be made. In general, a faint and depleted histochemical reaction for arginine and tryptophan was observed throughout all tissue layers following exposure to the pesticide. The observed reduction in protein content is likely due to altered membrane permeability caused by the toxicant. Present histochemical study showed that the pesticide Diazinon has adverse effect in gills and kidney[5,6,7,8,20]. Nutritional etiology of fatty liver has been recorded[12]. Lipids after carbon tetra chloride poisoning on squirrel has been recorded[18]. Diazinon has ecological risk in agricultural use[11]. It has been recorded that Diazinon treated fish showed abnormal behavior which include restlessness, arena movements, loss of equilibrium, increased opercular activities, strong spasm, and paralysis[17]. Diazinon has toxic effects on various organs on fresh water fish[1,2,4,13,15,19]. Measurement of bio-concentratation of pesticide by fresh water fish has been recorded[14]. Thus it may be concluded that our observations may be helpful to dispel doubts concerning the reliability of a pesticide exposure to the fishes.

Table 1. Distribution of arginine in the Gills of *Channa punctatus* after the treatment of Diazinon.

Treatment	Gill raker	Adductor muscle	Abductor muscle	Primary gill lamellae	Secondary gill lamellae
Control	++	++	+	+	+
Diazinon	□	□	□	_	_

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table 2. Distribution of arginine in the Kidney of *Channa punctatus* after the treatment of Diazinon.

Treatment	Proximal Convoluted tubule	Distal Convoluted tubule	Glomerulii	Medullary Region
Control	++	++	+	+
Diazinon	□	–	–	–

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table 3. Distribution of tryptophan in the Gills of Channa punctatus after the treatment of Diazinon.

Treatment	Gill raker	Adductor muscle	Abductor muscle	Secondary gill lamellae	Primary gill lamellae
Control	++	++	++	+	+
Diazinon	_	□	_	_	_

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

Table 4. Distribution of tryptophan in the Kidney of Channa punctatus after the treatment of Diazinon.

Treatment	Proximal Convoluted tubule	Distal Convoluted tubule	Glomerulii	Medullary Region
Control	++	++	+	+
Diazinon	□	_	_	_

+++, Very Strong Activity, ++, Strong activity, +, Moderate Activity, □, Dull Activity and □ Nil Activity.

References

1. Al-Arabi, S.A.M. (1992) : Toxicity of Diazinon to three species of Indian major carps. *Bdesh. J. Tran. Dev.* 5(1):79.
2. Alam, M.G.M. (1995) : Toxicity of Diazinon to the fry of Indian major carps *Cirrhinus mrigala*, Hamilton. *Bdesh. J. Zool.* 23(2):183.
3. Adams, C. W. M. (1957): A p-dimethylaminobenzaldehyde–nitrite method for the histochemical demonstration of indoles (tryptophan). *J. Cli, Path.*, 10(1), 56–60.
4. Ahirwar R, and Singh R. P. (2014): Diazinon disrupt lipid in *Channa punctatus* :Current trends in biological sciences-Advances and challenges. *Zool. Dept. J.C. Coll. Bakewar*. pp. 31Souvenir.
5. Ahirwar R, and Singh R. P. (2011): Diazinon disrupt lipid on respiratory and excretory organ of *Channa punctatus*. National symposium on integrated farming system for sustainable agriculture: Challenge and Opportunities. *Inst. Basic sci. BU Jhansi*. pp.154 Abstract.

6. Ahirwar R, and Singh R. P. (2015): Diazinon disrupt lipid on respiratory and stomach in *Channa punctatus*. National conference on biotechnology and human walfare: new vistas. *Biotech. Dept. VBSPU Jaunpur*. pp.147 Souvenir.
7. Ahirwar R, and Singh R. P. (2015): Diazinon disrupt lipid in *Channa punctatus*. *J. Exp. Zool. India.* 18:71-73.
8. Ahirwar R, and Singh R. P. (2016): Diazinon disrupt lipid on excretory organ and stomach of *Channa punctatus*. *J. Flora and Fauna*. 22(1):121-124.
9. Baker (1947): Further remarks on the histochemical recognition of lipine. Quart. J. Micr. Sci. 88, 463-465.
10. Bancroft, J. D. (2008): *Theory and Practice of Histological Techniques (6th ed.).*
11. Gidding, J.M. (2000): Ecological risk on Diazinon from agricultural use in the Sacramento- San Joaquin river basins California. *Risk analysis* 20:245.
12. Heard, K. and P. Platt (1964): The nutritional etiology of fatty liver. In Dawson(Eds. R.M.C. and Rhodes, D.N.) Metabolis and physiological significance of lipids. *New York John Wiley and Sons.* pp. 435-442.
13. Haque, M.M. (1998) : Toxicity of Diazinon and Submithion to *Puntius gonionotus*. *Bdesh. J. Trans. Dev.* 6(1):19.
14. Kanazawa, J. (2006) : Measurement of bioconcentratation factors of pesticide by fresh water fish and their correlation physicochemical properties. *Pest. Sci.* 12(4):417.
15. Lovely, F. (1998) : Toxicity of three commonly used organophosphorus insecticide to Thai sharputi (*Barbodes gonionotus*) and African cat fish (*Clarias garipinus*). *Department of Fishries Biology and Genetics, Bangladesh.* pp. 83 M. S. thesis.
16. Neumeister, R**.** (1890): Über das tryptische Spaltungsprodukt der Eiweissstoffe. *Zeitschrift für Physiologische Chemie*, 14**,** 63–75
17. Rahman, M.Z. (2002) : Effect of Diazinon 60 EC on *Anabas testudineus, Channa punctatus, and Barbodes gonionotus. Naga I.C.L.A.R.M.* 25(2):8.
18. Rana, S.V.S. (1971): Lipids in the liver of squirrel after the carbon tetra chloride treatment. *Acta. Histochem.* 41: 125.
19. Rao, K. R. (1985) : Toxicity of Elsan to Indian snakehead *Channa punctatus. Ind. J. Fish.* 32:153.
20. Sharma, V.I. and R. Ahirwar (2006): Histological and histochemical studies on digestive system, gill, liver and kidney of fresh water fish due to pesticide toxicity. pp.164 Ph.D. thesis.
21. Sakaguchi, S. (1925): Über eine neue Farbenreaktion der Proteine und Aminosäuren. *Journal of Biochemistry (Tokyo),* 5, 25–31.