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STUDY ON EFFECT OF ALDRIN AND METACYSTOX IN MONTHLY VARIATION ON GLUCOSECONTENT IN *MYSTUS VITTATUS*

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ABSTRACT

Glucose is estimated to maintain the general metabolism of the body along with ovary. The glucose level in blood serum was recorded minimum during resting and the maturing periods while the record was estimated to maximum at mature and spawning period. The insecticide treated fishes are subjected to hypoglycemia in Serum as well as in solid tissues like liver, muscle and ovary, but the hypoglycemia has been recorded to be more pronounced in I1 treated fish than those in I2, owing to the fact that Aldrin is more toxic than Metasystox.

Keyword: Glucose, Aldrin, Metasystox

INTRODUCTION

Aldrin is an organochorine insecticide and Metasystox is an organophosphate insecticide. *M. vittatus*is one of the commonly available teleost inhabiting in low lying paddy fields in addition to being caught from every type of freshwater bodies of Northern Bihar. The fish is relished as food by common rural people. Such an investigation is necessary for maintaining healthy stock of population of fish as it is primary concern of the government and non-government organizations to keep the quality of water of every water body to a level sustainable by the fishes so that this species along with other are not adversely affected for the benefit of common mass.

MATERIAL AND METHODS

Healthy female specimens of *Mystus vittatus*with a vernacular name Tenegra *were* collected from water bodies in the vicinity of Muzaffarpur, Bihar. The female fish of 70 to 90 mm length group and 6 to 8 gm weight group were sorted out in the laboratory and subjected to quarantine and acclimatization process as given in the American Public Health Association (APHA 1985) by treating the fish with 0.15mg/L aqueous solution of Potassium Permanganate (KMNO4) for about 12 minutes to keep them free from possible dermal infections.

The fishes were released in 20 L non-metallic (glass) aquaria containing ground water and observed for 48 hours. The entire population was discarded when it was seen that mortality is exceeding more than 10%. After the treatment with disinfectant the fishes were subjected to washing with several changes of tap water (containing at least 25 litres of laboratory ground tap water and then kept in fresh glass aquaria containing 25 litre laboratory tap water for one week as acclimatization measures in the laboratory condition. Thereafter the experimental fishes were used for carrying out bioassay experiment. Each experimental aquarium was provided with 10 test fishes. The fish containing aquarium was placed in a space receiving natural temperature (23.00 + 3 c) and photoperiod. During acclimatization and experimentation, the fishes were provided piece of goat liver *ad libitum* and artificial food available in the market such as "Tubifix Worms". The fish were disallowed the food during and 24 hours prior to their use for conducting bioassay test (acute toxicity test).

The ground water received through the tap water of R.D.S. college campus showed the following physio-chemical characteristics used in the present study in respect to the parameters such as pH, dissolved oxygen, total hardness, total alkalinity as. The pH of the water was measured by pH meter (portable) and the other parameters were detected by titration method i.e. dissolved oxygen by Wrinker's Iodometric-Azide method total chloride by argentometric method, total alkalinity as Caco3 by EDTA titration method as given in APHA (1971). Commercial formulation of two insecticides ALDRIN and METASYSTOX were purchased from local markets. ALDRIN contained 30 % emulsifiable concentrate (EC) or active ingredient, while the METASYSTOX possessed 25% EC. The stock solution were prepared in the absolute acetone on the basis of their active ingredients adopting the diluting techniques given in STANDARD METHODS.

The cause of using acetone is that this is one of the ideal solvents for every insecticides due to its non-toxic character up to a relatively high concentration (Pickering *et al.*, 1962). The authors in the present study used the maximum concentration of acetone less than 0.1ml/ L. Therefore the same quantity of acetone was also added to the water of control experiments. Test solution were freshly prepared out of stock solution, and stored beforehand. Subsequently, the same were

changed as every 24 hours interval during the bio-assay tests and acute exposures up to 96 hours, thereafter on every alternate day during long term exposures to sub lethal concentration.

Procedure of Blood Serum Sampling:

Individual fish was taken out from the drum and caught in hand after washing with distilled water. A glass syringe (Sterilized, even dried and refrigerated in freezer) of 2 ml capacity having 26 gauge bevel needle was introduced quite deep through the median line just behind the anal fin indorsocranial direction towards the cauda dorsalis, retaining the bevel anteriorly. The blood was gradually sucked into the syringe. The collected blood was taken into centrifugation tube and allowed to cool at room temperature for 15 minutes. The clot was not disturbed from the wall of the tube by carefully running a clean applicator stickaround the inner surface of the tube. The blood was immediately centrifuged at 2500 rpm for 10 minutes and the supernatant serum was removed with the help of a rubber bulb pipette. The serum thus obtained was stored into a vial in deep freeze, usually not more than 2 h for further investigation.

After the collection of serum the fish was dissected out and its ovary, liver and muscle, quickly excised and cleaned off extraneous materials and separately placed in ice-cold fish saline in Petri dish and then placed in freezer. Fish saline Young (1993) has the following constituents:

Sodium chloride = 5.50 gm

Potassium chloride = 0.14 gm

Calcium chloride = 0.12 gm

Dechlorinated water = 1 litre

Before use, the tissues were nicely blotted with filter paper. The length of ovary was measured *in situ* while the weight of ovary was measured immediately after its removal. The gonadosomatic index (GSI) and ovarian index (OI) were calculated with the help of following formulae:

GSI% = Weight of ovary (mg)/ Weight of Fish (gm) X 100

OI (gm/cm) = Weight of ovary / 2 (gm)

The total weight of ovary and total length of ovary were both divided to obtain average values, thus their anatomical abnormalities regarding the left and right ovaries are minimized to a greater extent.

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Histological & Histochemical Techniques

Fixatives such as formal calcium, 10% neutral formalin, Bouin's fluid, Carnoy's fluid, Zenker's fluid and alcoholic Bouin were used both for Histological and histochemical studies. As usual, the ovaries were then washed, dehydrated, cleared and embedded in paraffin wax at temperature of 58-60 degree C. Sections were cut 8 to 10 inches thick and then used to stain with haematoxylin/ eosin, Massion's trichrome, Mallory's triple stain and Azan's stain for all histological analysis. For histochemical studies the paraffin sections were treated under various techniques for the localization of different organic constituents, like, proteins, lipids, carbohydrates and nucleic acids. Lipids were identified by fixing the ovaries only in formal saline as other fixative may dissolve the lipid components completely. The materials were post-chromed embedded in gelatin and cut on freezing microtome to obtain 20 inches thick section. The sections were processed to locate the lipid and micro photographed immediately without any delay.

OBSERVATION

A cursory view on the table related to glucose shows that the level of glucose kept continuous increase from January (42.00) up to the August (141.0) thereafter the level decrease gradually up to December (71.39) in control fishes. Again the value of controlled group was minimum in January (42.00) and highest during August (141.00). The same trend was noticeable in both the insecticidal treated fishes. There was statistically significant decrease in the level of glucose in all the months in respect to their control. However the decreased value was more pronounced in I1 than in I2 when compared with their respective controls.

DISCUSSION

The biochemical content glucose has been estimated in all the months of a year in ovary, liver, muscle and blood serum and recorded in Table no. 11. A perusal in seasonal variation in glucose clearly reveals that the fluctuation in their amount occurs in a cyclic manner which compels the workers to attribute their role in controlling the breeding cycle of the fishes (Shrivastava and Singh, 1981; Sastry et al, 1982; Grant and Mehrle, 1973; Nillsson et al., Eller 1971 b etc.) The glucose level in blood serum was recorded minimum during resting and maturing phase while the record was estimated to maximum at mature and spawning period. The value of glucose was maximum in muscles and liver during the resting and maturing phase, and minimum during mature and spawning period. This behavior in the level of glucose is attributed to its diversion into ovary through the blood circulation which is essential for its sufficiently supply to meet demand of energy during vitellogenesis which is found at peak during mature and spawning

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period of the fish. Additionally the glucose is essential to maintain the general metabolism of the body along with ovary. The insecticide treated fishes are subjected to hypoglycemia in Serum as well as in solid tissues like liver, muscle and ovary, but the hypoglycemia has been recorded to be more pronounced I I1 than those in I2 when compared to their controls precisely, owing to the fact that I1 (Aldrin) is more toxic than the I2 (Metasystox).

Table-1

Monthly Variation in the content of glucose of ovary (mg/gm), liver (mg/gm), muscle (mg/gm) and serum (gm/100ml) under control (C) and two separately used insecticides: aldrin (I_1) and metsystox (I_2) induced Mystus vittatus

Month	Ovary (mg/gm)			Liver (mg/gm)			Muscle (mg/gm)			Serum (gm/100 ml)		
	C	I_1	I_2	C	I_1	I_2	C	I_1	I_2	C	I_1	I_2
Jan	4.09 ±1.01	3.23 ± 1.91×	3.91 ±2.00×	57.33 ±2.00	47.72 ±2.01*	48.79 ±2.09*	19.00 ±2.00	15.00 ±1.98*	17.00 ±2.1×	42.00 ±0.33	25.00 ±0.81*	33.00 ±1.01×
Feb	4.99 ±1.01	3.48 ±0.98+	3.77 ±0.88	51.22 ±2.11	39.00 ±2.01*	41.33 ±1.98×	15.08 ±0.53	10.12 ±0.23*	13.93 ±0.49×	39.00 ±1.12	19.00 ±1.01*	25.00 ±0.38*
Mar	5.00 ±0.91	4.87 ±0.62+	4.03 ±0.70+	48.34 ±0.98	37.09 ±0.87×	38.11 ±0.43×	14.99 ±1.21	10.88 ±0.68*	13.88 ±0.67×	54.11 ±0.77	41.89 ±0.21*	47.12 ±0.29×
Apr.	19.04 ±1.31	13.91 ±1.11*	15.21 ±1.68×	24.32 ±0.31	20.99 ±0.23×	21.33 ±0.87+	12.27 ±0.91	9.15 ±0.19*	9.98 ±0.68+	83.42 ±0.18	62.33 ±0.92*	68.23 ±0.87×
May	20.62 ±2.00	15.53 ±2.1×	19.01 ±2.01+	22.89 ±0.61	18.88 ±0.32×	19.23 ±0.85+	8.78 ±0.81	6.34 ±0.28*	7.72 ±0.49×	99.78 ±0.25	68.11 ±0.46*	78.88 ±0.58×
Jun	21.42 ±2.11	16.92 ±2.12×	18.39 ±1.37+	20.02 ±0.52	16.37 ±0.43*	18.87 ±0.39×	7.88 ±0.23	6.00 ±0.41*	6.98 ±0.47×	111.11 ±0.82	78.29 ±0.72*	87.28 ±0.48×
Jul	22.93 ±1.21	17.90 ±1.05×	19.11 ±0.92+	19.99 ±0.97	15.29 ±0.91*	16.99 ±0.68*	5.90 ±0.31	5.01 ±2.01*	4.48 ±2.0×	128.00 ±4.43	88.00 ±3.3*	97.00 ±3.89×
Aug	24.21 ±1.43	18.69 ±0.98×	20.00 ±1.20+	18.11 ±0.87	14.98 ±0.29*	16.01 ±0.49	4.99 ±0.83*	4.07 ±0.42*	4.11 ±0.53	141.00 ±6.23	98.00 ±3.43×	111.00 ±3.98+
Sep	8.00 ±2.1	10.00 ±1.98	9.21 ±1.23+	38.00 ±1.78	28.00 ±1.93×	18.45 ±1.66+	9.90 ±2.01	4.13 ±1.33*	5.12 ±1.89×	113.00 ±3.41	69.00 ±2.11*	90.00 ±2.87×
Oct	6.00	5.58	5.87	39.91	33.31	24.09	13.00	7.22	8.43	104.00	59.99	97.23

	±2.3	±2.1+	±2.21+	±1.98	±0.39+	±0.67+	±0.64	±0.34*	±0.49×	±3.24	±2.03*	±2.66×
Nov	4.99 ±3.1	4.01 ±2.46×	4.19 ±2.45×	53.00 ±0.59	40.00 ±0.38*	43.00 ±0.48*	16.00 ±2.67	12.00 ±2.12*	14.00 ±2.38×	79.79 ±0.77	60.00 ±0.54*	62.00 ±0.63×
Dec.	4.00 ±1.21	3.08 ±0.87×	3.78 ±0.98×	54.08 ±2.11	44.80 ±1.80*	45.67 ±1.98×	26.91 ±0.84	24.33 ±0.73*	26.23 ±0.79×	71.39 ±0.66	56.00 ±0.47×	59.22 ±0.58×

CONCLUSION

On the back drop of the investigation made on the fish *Mystus vitatus* it appears logical to draw the conclusion that the aldrin, an organochloridecompound is more toxic than Metasystix an organophosphate compound even in their lowest level might not be able to kill out the fish but they have oberved to disturb the metabolism of glucose which can be manifested by their negative effect on GSI, OI, OD and occurrence of percentage frequency of normal as well as atretic oocytes. It is justified to envisage that these toxic and metabolism impairing substances might get accumulated for causing slow but continuous damage to the extent that the processof vitellogenesis, so important for reproduction in oviparous animals, become affected that becomes the impelling cause of reducing the biotic potential of fishes and other organisms too whether flora or fauna. Therefore the outcome of the present investigation siuggested to impose a ban on indiscriminate use of insecticidesor any biocide and if they are used thr government and other non-government organizations have to make the periodical check up of toxic substance in water, as water is the dwelling niche of fishes which are nutritionally rich and have their reach to common mass in comparison to other consumable animals as food.

REFERENCES

Tappel, A.K. 1968. Antioxidant materials show aging process. *Geriantus*, 23:97.

Thakur, C.M. 1990 Histochemical analysis of the seasonal changes in the ovarian tissue of certain freshwater fishes, Ph.D. Thesis, Bihar Univ. Muzaffarpur, Bihar

Susca, V. ; Corriero, A. ; Bridges C. and De Metro, G. 2001 Study of the sexual maturity of female Bluefin tuna, purification and partial characterization of vitellogeninimmunosorbent assay. *Journal of Fish Biology*, 58(3) : 815-831(17)

Venugopal G. 2005 Alternative induced agents for fish breeding. Souvenir of 1st National Conference on Freshwater Aquaculture and its Prospects in North Bihar. R.D.S. College, B.R.A. Bihar Univ. Muzaffarpur, Bihar. P. 12-15 and 25-27