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ALTERATION OF BIOCHEMICAL PARAMETERS IN THE BREEDING CYCLE OF *MYSTUS VITTATUS* (BLOCH.) EXPOSED TO MUNICIPAL SEWAGE AT BASTI CITY (U.P.)

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ABSTRACT: Biochemical disorder in fishes are intimately associated with inclusive physiological hindrance. Many types of biochemical faults and deformity in the metabolism of carbohydrates, Proteins, fats and Nucleic acids are finding in different tissue of environmentally stressed fishes. The responsibility of gonadial tissue i.e. testes and ovary are upgrade many times during the breeding phase of the reproductive cycle of teleost fishes. Any biochemical deformity in their tissues would adversely affect the reproductive activity of fish population. Fresh water pollution mainly of the Kuwano river is caused by runoff from house drains, street disposal, sewage and effluents from small and large scale of industries situated nearby the river. On spot observations indicate that heavy fish mortality has been occurring in the areas in the river Kuwano contaminated by municipal sewage. The examined biochemical parameters were glycogen, amino acids, and cholesterol. The acute toxicity and bioassays of sewage exposed to test fish Mystus vittatus has been conducted for its three breeding phases i.e. pre-spawning, spawning and post-spawning.

KEYWORDS: Biochemical, breeding cycle, M.vittatus, Basti,freshwater.

INTRODUCTION: Water pollution is a major environmental issue in India. The largest sources of water pollution in India is untreated sewage. Other sources of pollution include agricultural runoff and unregulated small scale industry. Most of rivers, lakes, and surface water in India are polluted. The fast industrialization in India have created a great problem of water disposal. In general factory effluents are indiscriminately discharged in nearby fresh water reservoir without any treatment. The population growth has created serious problem in urban as well as in rural areas. In India 900 million gallons of sewage is produced per day. Of the total sewage produced, 30% of above amount comes from urban areas. It has been known by estimation that only 20% of per day sewage produced in our country is properly treated and rest approximately 80% still remain to be treated.

Basti city is an important district of eastern region of Uttar Pradesh, India. It is rich in both lentic and lotic freshwater bodies. River Kuwano run across the district and is a major sources of fish, is adversely contaminated by industrial as well as toxic sewage wastes. The polluted water in ground is harmful to fishes. A number of workers are engaged in research work on the water pollution by the industrial effluent and sewage wastes during recent years[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17]

MATERIALS AND METHODS

The fishes were acclimatized under the conditions of laboratory for 3-4 weeks and they were maintained in the dechlorinated tap water at room temperature. The municipal sewage were collected every time at about 8.00 AM under the normal course. The samples were neither filter nor neutralized. The collected samples were analysed in chemical laboratory.

The acute toxicity and bioassays of sewage wastes exposed to the test fish was conducted throughout the year covering all the three phases of annual breeding cycle i.e.(February 2017 to January 2018) Pre-spawning,Feb.-may, Spawning June-Sept. and post-spawning oct.-Jan. phases for 24hrs.,48 hrs., 72 hrs. and 96 hrs. in the liver, blood, testis and ovary. The tissues were exposed to two sublethal concentration of 50% and 80% for LC_{50} and compared to the tissues of controlled fishes. The data of different exposure periods were put to statistical analysis.

RESULTS AND DISCUSSION

The test fish *Mystus vittatus* was subjected to the different exposure periods against the municipal sewage waste throughout the annual breeding cycle i.e., pre-spawning, spawning and post-spawning phases. Thus the mortality experiments were conducted throughout upto 96hrs. and mortality percent was noted after every 25hrs. in the test fish population. The LC_{50} values exhibited remarked seasonal variation and showed negative correlation with water temperature. The LC_{50} values were observed to be maximum during the cold months of the year i.e., December, January and march with water temperature ranging between 22^0C-25^0C while the values were minimum during the hot months i.e., May, June, July, and August with water temperature ranging between 27^0C – 35^0C.

Satisfied biochemical constituents in healthy fish kept in normal tap water were examined throughout the year covering all three phases of breeding cycle of the test fish. The examined biochemical parameters were glucose, glycogen, protein, amino acids were quantitatively measured in the liver tissue, glucose, protein, amino acids and cholesterol in the blood where as glycogen, protein, and amino acids were examined in testis and ovary(Table-1&2). The values of all the biochemical organic constituents were measured to be maximum during spawning phase compared to pre-spawning and post-spawning phases of the annual breeding cycle of the control test fishes.

The test fishes were exposed to two sublethal concentrations i.e., 50% of 96hrs. LC^{50} and 80% of 96hrs.. LC^{50} (Table-1&2) exposed to sewage and the changes produced in the biochemical

Table-1. Biochemical profile examined in liver, blood and gonads of *M. vittatus* under stress of 50% of 96hrs. LC_{50}

S.No.	Biochemical constituents	Tissue	Pre-spawning phase	Spawning phase	Post-spawning phase
1	Glucose	Liver Blood	+ 20.12 + 8.59	+15.98 +7.65	+8.48 +6.41
2	Glycogen	Liver Testis Ovary	- 36.94 - 35.96 - 19.89	-18.97 -43.89 -20.23	-5.32 -34.12 -11.12
3	Protein	Liver Blood Testis Ovary	+ 18.59 - 24.93 - 29.89 - 41.69	-36.69 -32.96 -21.32 -21.65	-14.98 -35.69 -20.98 -36.45
4	Amino acid	Liver Blood Testis Ovary	- 3.5693 + 9.12 + 4.789 + 4.3589	+7.5398 +5.968 +6.9841 +2.2365	+11.65 +5.789 +7.1256 +3.2986
5	Cholesterol	Blood	- 1.698	-1.5968	-1.3198

(+=Increased, - = Decreased)

constituents were studied during breeding cycle. The changes were stress induced greater in 80% sublethal concentration than in case of 50% sublethal concentration such as-

1. Glucose level of liver tissue and blood increases
2. Glycogen content of liver decreased
3. Protein content of liver, blood and tesis and oyary decreased
4. Amino acids content of liver, blood, and testis and ovary increased
5. Cholesterol content of blood decreased.

Table-2. Biochemical profile examined in liver, blood and gonads of *M. vittatus* under stress of 80% of 96hrs. LC_{50}

S.No.	Biochemical constituents	Tissue	Pre-spawning phase	Spawning phase	Post-spawning phase
1	Glucose	Liver Blood	+61.94 +41.39	+21.36 +26.98	+49.59 +21.98
2	Glycogen	Liver Testis Ovary	-48.66 -56.94 - 38.83	-36.56 -59.68 -32.89	-25.68 -45.94 -43.28
3	Protein	Liver Blood Testis Ovary	-65.96 -45.23 -38.25 - 64.39	-44.68 -49.86 -35.25 -68.96	-56.65 -63.95 -31.98 -59.23
4	Amino acid	Liver Blood Testis Ovary	+13.62 +23.56 +14.98 +11.2356	+17.45 +14.96 +17.89 +15.23	+22.32 +15.98 +18.96 +13.56
5	Cholesterol	Blood	-3.2968	-3.9876	4.9968

(+=Increased, - = Decreased)

The above table-1&2 concerning physiological disturbances may definitely be presumed as being reflected in the disturbed biochemical profile examined in the test fish Mystus vittatus under stress of environmental contaminates of municipal sewage. The similar results were obtained by Gayatri (2004) and Pandey et.al.,(2005) and Prasad Ambika et.al., 2007) are in conformity with results obtained during present investigation.

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