RESEARCH ARTICLE

Effect of Malathion on DNA and RNA in gills of *Labeo rohita*

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ABSTRACT

As *Labeo rohita* is dominant fish of water bodies in the region, the present the effect of sublethal concentration of malathion is studied by exposing the fish to it. The estimation of DNA and RNA and its ratio were emphasized in the present investigation. The sublethal concentration of malathion was found to be 0.00053 µl/ lit. Tissue samplings were done on 0, 24, 48, 72, 96 hours on malathion exposure. DNA level was found to be reduce by 11.28, 10.74, 10.23, 11.28 % in the experimental as well as RNA level by 19.28, 19.17, 18.22, 17.79 % in the experimental animals. Obviously, the change was observed in the RNA/ DNA ratio. DNA/ RNA ratio was found to be 1.70, 1.78, 1.78, and 1.57 comparison was made with the experimental groups.

Keywords: Malathion, *Labeo rohita*, DNA, RNA.

INTRODUCTION

The *Labeo rohita* commonly called as *rohu, rui, roho* in the investigation area. It is large omnivore and extensively used in in aquaculture in Umarkhed and allied area. In the present investigation area, there are modern agricultural practices to increase the crop production of Jowar, Soybean, Cotton and Wheat. Use of organic pesticides was found to be common in the area. It not only pollutes environment but the issue is linked with the unbalance of ecosystem. There was found to be hazardous effect on producers, consumers, decomposer, soil, water and pH. The often and over use of pesticides like malathion causes damage to the many soil organism as well as aquatic animal and public health. In aquatic animal malathion found to be influence the productivity of fish, fish eggs, and larvae of many aquatic animal (Helfrich and Neves, 2009). In spite of global concern about the effect of pesticides on food web and food chain, a very little attention has been paid on the fate of pesticides in non-targeted animals (Khan *et al*., 1977) and Hulber (1975) there where noticeable changes particularly physiological and histopathological found in fish (Holden, 1973). Pesticides certainly control the pest and enhance crop production but cause noticeable damage to the ecosystem.

The degree of toxicity effects of the poisonous substance is dose independent upon environmental conditions such as solubility,

temperature, pH, oxygen content and presence of residue molecules (Capkin *et al*., 2006; Singh and Mishra, 2009; Gulfer *et al*., 2009). It is well known facts that protein, carbohydrates and lipid play a major role as energy precursors in fish under condition of stress. Enzymes are playing significant role in food utilization and metabolism. The proteolytic enzymes participate in the breakdown of protein molecules into amino acids and these amino acids after oxidization turn to give energy for body function (Saravanan *et al*., 2000).

In the present work the most popular and dominant fish of the local area, *labeo rohita* is chosen for the investigation. Malathion is the staple pesticides of farmer of the area, but noticeably toxic to the fish. Therefore, the effect of malathion on the gills of the fish is chosen to study the DNA, RNA and DNA/ RNA ratio.

MATERIALS AND METHODS:

The Indian major carp *labeo rohita* chosen for investigation were directly collected from the Ambona lake which situated in tahsil of Yavatmal district of Maharashtra (India). It is about 2.5 km away from the city, Umarkhed. The fish length 12 ± 15 cm and weight 22 ± 38 gm were selected. Fish (*Labeo rohita*) were collected and kept in aquarium. They were fed daily and acclimatized in laboratory for 30 days. The physical and chemical analyses of the water were carried out (APHA, 2005). They were divided into two groups control and experimental, seven individual in each group were put for the investigation. Acute toxicity study was carried out using the standard guidelines (EPA/ROC, 1998) to determine the LC_{50}. LC_{50} of malathion was determined was found to be 0.00053 micron/ lit for 96 hours. The group of fish were sacrificed on 24, 48, 72, 96 hours of treatment. Control and experimental animal were dissected in separately in groupwise manner intent to remove gills. Removed gills were washing in saline, blotted and frozen deeply at the same time. Homogenate (10%) was prepared in buffer solution (0.15% mol/ 1 NaCl and 0.15 mol/ sodium citrate, pH 7.0). At the rotation of 8000 rpm for 15 min homogenate was prepared. Produced supernatant was taken for estimation of DNA and RNA. The method was applied for the same was Diphenylamine and Orcinol respectively (Schneider, 1957). Absorbance was recorded at 595, 665, and 660 nm for DNA and RNA in the experimentation.

RESULT AND DISCUSSION:

During the acute toxicity tests, the fish were seen to exhibit several behavioural responses, such as fast jerking, frequently jumping, erratic swimming, spiralling, convulsions and tendency to escape from the aquaria. Following this state of hyper excitability, the fish became inactive and loss of orientation. There was loss of equilibrium and paralysis which ultimately resolved in death of the fish. These altered behavioural abnormalities were observed only at high concentration ranges (values higher than 96 h LC50). In the present investigation the carp *labeo rohita* exposed to the said sublethal concentration of the pesticide Malathion the organophosphate, it was determined that there is significant decrease in the level of DNA and RNA. DNA level was found to be decreased 11.28 to 8.64 and the RNA level from 19.28 to 17.79. The RNA DNA ratio was found to be significantly changed from 1.70 to 1.95 (Table 1).

Table 1: Effect of malathion on DNA and RNA in gills of *labeo rohita*

Sr. No.	Exposure period	DNA		RNA		DNA / RNA ratio	
		Control	Experimental	Control	Experimental	Control	Experimental
1.	24	7.12 (0.014)	11.28 (0.011)	19.98 (0.016)	19.28 (0.030)	1.86 (0.027)	1.70 (0.016
2.	48	6.98 (0.012)	10.74 (0.016)	18.76 (0.022)	19.17 (0.042)	1.83 (0.018)	1.78 (0.013)
3.	72	6.42 (0.018)	10.23 (0.021)	18.57 (0.122)	18.22 (0.036)	1.85 (0.031	1.78 (0.016)
4.	96	5.77 (0.021)	9.11 (0.017)	17.98 (0.013)	17.79 (0.037)	1.65 (0.024)	1.57 (0.013)

*The values are expressed as Mean ± SEM and the mean difference is significant at the 0.05 level.

Pesticides toxicity in fish has been studied by several workers. It causes histopathological changes. The present investigation was found to be consistent with that Chakraborty and Roy (2017), Steven *et al*., (1983), Bonny's *et al*., (2008), Ali *et al*., (2009) and Zitkov *et al*., (1977). Chakraborty and Roy (2017) determine the changes genomic level of fish tissue due to pesticide pollutions. They found the decrease level of DNA in the tissue of brain of the fish. The result of present investigation revealed that sub-lethal concentration affected the DNA and RNA and its ratio, which may affect the survival of the fish, *Labeo rohita*. As fish is one of the diets, as fish has flavour, number of nutritional benefits such as omega-3 fatty acids lot of easily digestible proteins. To minimise the use of organophosphate like Malathion, there is need of creating the awareness in farmers and to encourage them for organic farming.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

Ali D, et al (2009) Assessment of genotoxic and mutagenic effect of chlorpyrifos in fresh water fish *Channa punctatus* (Bloch) using micronucleus assay and alkaline single cell gel electrophoresis. Food and Chemical Toxicity, 47 (3): 656- 661.

APHA (2005) Standard Methods for the examination of water and waste water. 21st Ed. Washington DC.

Bony S, et al (2008) Genomic pressure of vineyard pesticides in fish; field and mesocosm surveys. Aquatic Toxicity, 89 (3): 197-203.

Capkin E, Altinok I, Karahan S (2006) Water quality and fish size affect toxicity of endosulfan, an organochlorine pesticide, to rainbow trout. Chemosphere, 64: 1793-1800.

Chakraborty M and Deepronil Roy (2017) IOSR. Journal of Environmental Science, Toxicity and Tood Technology, 11 (5): 06-11.

EPA/ ROC (1998) Standard guide for conducting acute tests with fishes: static renewal test for common carp. NIEA B904. 10B. Environmental Protection Administration of the Republic of China, Taipei, Taiwan (in Chinese).

Gulfer B, Coskun M, Kayis T, Emre I (2009) Impact of organophosphorus insecticide, Malathion on the progeny sex ratio of *Pimpla turionellae* L., J. Environ. Biol, 30: 727- 730.

Helfrich LA and Neves RJ (2009) Sustaining America's Aquatic Biodiversity. Freshwater Fish Biodiversity and Conservation. Virginia Cooperative Extension Publication, Virginia Polytechnic Institute and State University, 420-425.

Holden AV (1973) Effect of pesticide on fish in environmental pollution by pesticides Ed C-A Edward Plenum Press NewYork, 213- 253.

Hurlbert SH (1975) Secondary effects of pesticides on aquatic ecosystems. Residue Reviews, 57:81-148.5.

Khan HA and Jhingran VG (1975) Synopsis of biological data on rohu, *Labeo rohita* (Hamilton, 1822). FAO Fish synopsis, 56:111

Saravanan TS, Aneez Mohamed M, Harikrishnan R (2000). Studies on the chronic effects of endosulfan on blood and liver of *Orechromis mossambicus*. J. Ecol. Res. Biocon, 1: 24 -27.

Schneider WC (1957) Determination of nucleic acid in tissue by pentose analysis. In: Methods in enzymology (Eds: Sp. Colowick and N.O. Kaplon). Academic press, NewYork, 4: 680-684.

Singh S and Mishra RN (2009) Occurrence of organochlorine pesticides residues in Kuano river of eastern Uttar Pradesh. J. Environ. Biol, 30: 467-468.

Steven C, Schimmel, Richard LG, et al (1983) Acute toxicity, bioconcentration, and persistence of AC 222,705, benthiocarb, chlorpyrifos, fenvalerate, methyl parathion, and permethrin in the estuarine environment, J. Agric. Food Chem. 31(1): 104–113.

Zitko V, Carson WG, Metcalfe CD (1977) Toxicity of pyrethroids to juvenile Atlantic salmon. Bull Environ Contam Toxicol, 18: 35–41.