Research Paper Zoology

Effects of Cypermethrin on Lipid and Cholesterol Contents of Freshwater Fish *Channa Orientalis* (Bloch).

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ABSTRACT

Water pollution is a major global problem that requires ongoing evaluation and revision of water resource policy at all levels. The water pollution is an acute problem in developing and industrialized countries. Fishes are very sensitive to a wide variety of toxicants in water and the deleterious effects of pesticides on fishes can be easily established. Ophiocephalus orientalis, freshwater fish exposed to sublethal concentration(0.0007µ/lit) of cypermethrin at different time intervals. Lipid and cholesterol contents were observed from liver and muscle after exposure period. There were decreased in lipid and cholesterol content at different time intervals.

KEYWORDS | Ophiocephalus orientalis, cypermethin, lipid, cholesterol.

INTRODUCTION:-

Pesticides are an integral part of present day agricultural technology. They are greatly contributing towards increasing world food supply by protecting the crop yield. Due to intensive development of agriculture in recent years and rapid growth of industrialization in our country, there has been a great increase in manufacture and utilization of fertilizers, pesticides, petrochemical products, detergents and other synthetic chemicals and pose a serious threats to the water ecosystem. Pesticides and related chemicals destroys the delicate balance between species and a functioning ecosystem (Khan and Francis,2005).

Pesticides are not highly selective but are generally toxic to many macrophytes, non-target organisms such as fish (Ayoola,2008; Franklin et al.,2010). Acute exposures of fish to pesticides result in some biochemical changes, causing some interference. Every living organism has its own so called detoxification mechanism to get rid of foreign substances in the body, however if toxic substances are encountered in higher concentration, they are bound to bring severe adverse effects (Satyavardhan 2010).

Some of the biochemical alteration occurring in the body gives the first indication of the stress in the organism and hence effect on the part of the pollution (Venkataramana et al.,2006; Rathod et al.,2009). The biochemical studies are good parameters which help to see the effects of toxicants on metabolism of fish (Kajare et al.,2000). In present investigation, an attempt has made to find out effect of cypermethrin on lipid and cholesterol constituents from liver and muscles of experimental fish, Ophiocephalus orientalis.

MATERIALS AND METHODS

The freshwater fish Ophiocephalus orientalis were collected from Wadali lake around Amravati region. The fishes were acclimatized at laboratory condition for 1 week. The LC_{50} value was calculated by probit analysis method (Finey,1971) . The LC_{50} value is 0.0007µ/lit. at 72hrs. The acclimatized fishes were exposed to sub lethal concentration for 24hr, 48hr, 72hr and 96hrs. Simultaneously a control group of healthy fishes were maintained under identical conditions. The fishes were sacrificed at the end of exposure period and liver and muscle were processed for the biochemical estimation. Lipids were estimated according to the method of Floch et al., (1957) . and cholesterol content was estimated with the help of Leiberman Burchad method by King and Wolten (1959).

RESULTS:-

The sublethal concentration of cypermethrin treated with Ophiocephalus orientalis at different time interval and observed that in the liver and muscle lipid showed declined trend. The lipid level declined in liver that is, 19.85±1.58, 18.67±1.68, 16.32±1.78, 15.66±1.79 as compared to control value 20.30±2.00 and in muscles that is, 9.89±1.58, 8.88±1.78, 7.45±1.68, 6.96±1.48 as compared to control value 10.30±3.00.

Lipids in liver and muscles of fish Ophiocephalus orientalis were decreased due to exposure to cypermethrin. Lipids constitute very rich energy reserve, it showed decrease trend indicates the changes in energy demand of fish during exposure to cypermethrin.

The sublethal concentration of cypermethrin treated with Ophiocephalus orientalis at different time interval and observed that in the liver and muscle cholesterol showed declined trend. The cholesterol level after exposure to cypermethrin was declined in liver that is, 10.38±0.07, 10.38±0.07, 10.36±0.02, 10.15±0.03 as compared to control value 11.45±0.70, 10.97±0.50, 10.96±0.50, 10.30±1.02 respectively. The cholesterol level declined in muscle that is, 0.89±0.06, 0.62±0.02, 0.51±0.03, 0.47±0.02 as compared to control value 1.35±0.93,1.24±1.00, 1.11±0.1, 1.00±0.5. The reduced cholesterol level due to the inhibition of cholesterol biosynthesis in the liver and reduced absorption of dietary cholesterol.

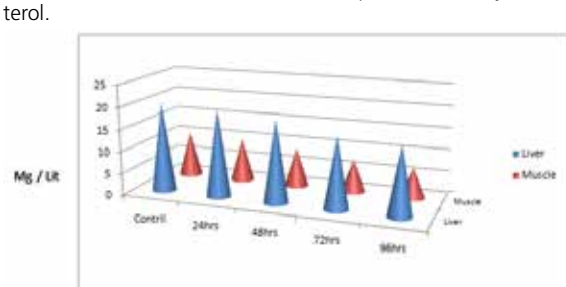

Fig.No.1Changed in the Liver and muscle lipid of the freshwater fish Ophiocephalus orientalis exposed to sublethal concentration of cypermethrin at different time interval. (Mg/lit).

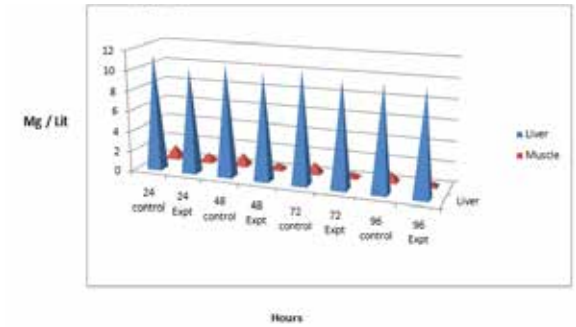

Fig.No.2 Changed in the Liver and muscle cholesterol of the freshwater fish Ophiocephalus orientalis exposed to sublethal concentration of cypermethrin at different time interval.(Mg/lit).

DISCUSSION:-

In the present investigation, cypermethrin exposed to freshwater fish Ophiocephalus orientalis. The level of lipid content decreased in liver and muscle tissues. Lipid plays an important role in energy metabolism and provide energy to metabolic processes. They are also important for cellular and sub-cellular membrane. It is used as energy reservoir, stored and transported in the form of glycerol ester. These decreased in lipid content in tissues suggested that the lipid have been channelized to meet the metabolic demand for extra energy needed to mitigated the toxic stress. Similar finding was given by Patil and Patole,(2012) that the effect of malathion and cypermethrin on lipid constituents of freshwater fish Lepidocephalicchthys guntea. They observed that, the level of lipid content decreased significantly in all treated groups,.

Lipid level decreases significantly because liver is the principle site of detoxification in fishes (Dixith, 2005). Stalin and Das, (2012) were observed the decrease in lipid levels in the liver tissues of Cirrhina mrigala exposed to fenthion.

The level of cholesterol content decreased in liver and muscle tissues. The reduced cholesterol level due to the inhibition of cholesterol biosynthesis in the liver and due to reduced absorption of dietary cholesterol. There was also depletion in the lipid content of fish Tilapia mossambica exposed to monocrotophos reported by Remia et al., (2008).

Ganeshwade (2012), reported that there was decrease in cholesterol content in the liver and muscle tissues of freshwater fish Punctius ticto. Due to dimethoate toxicity stress which suppressed lipid metabolism and leads decrease value of cholesterol Choudhary and Gaur (2001); Shindhe et al., (2002). Cholesterol is an important normal body constituent used in the structure of cell membrane synthesis of bile acid and synthesis of steroid hormones. Significant decrease in cholesterol content is studied in fish Oreochromis niloticus by Kahtani, (2011).

REFERENCES

Ayoola S.O. (2008): Toxicity of glyphosate herbicide on Nile tilapia (Oreochromis niloticus) juvenile. Afr. J. Agric . Res. Vol.3(12) : pp. 825-834. | Chodhary, A. and Gaur S. (2001): Effect of sodium fluoride on the muscle and liver of a freshwater fish I. J. Aqua. Biol.Vol. 16(2) :pp. 67-68. | Dixit Y.B. (2005): Biochemical changes in the liver of a freshwater teleost, Heteropneustes fossilis (Bloch) exposed to rogor J. Zool Vol.25:pp.51-53. | Finney,D.J. (1971) : Probit Analysis. University Press Cambridge. pp.333. | Folch, J.N. Leer and Sloane, G. Stanley (1957) : Simplified method for isolation and purification of total lipids from animal tissues, J. Bio. Chem 226- 497. | Franklin R.K., H.S.Loo and H.A. Osu.anu, (2010): Incorporation of Bentazone with Exrerohilum rostratum for Controlling Cyperus iria A.M. J. Agri. Biol.Sci., Vol.5: pp.210-214. | Ganeshwade R.M. (2012): Effect of Dimethoate on the level of cholesterol in freshwater Puntius ticto (Ham). Sci. Res. Report. Vol. 2(1) :pp. 26-29. | Kahtani Mohammed A. Al (2011) : Effect of an Insecticide Abamectin on Some Biochemical Characteristics of Tilapia fish (Oreochromis Niloticus) American Journal of Agricultural and Biological Sciences Vol.6(1) : pp.62-68. | Kajare,A., S. Singh and K. Shrivastava (2000): Malathion induced biochemical changes in kidney of freshwater fish Clarias batrachus. J. Ecotoxicol. Environ. Monit. Vol.10, pp. 11-14. | Khan Zaheer M. and Francis C.P. Law (2005): Adverse effects of pesticides and related chemicals on enzyme and hormone systems of fish, amphibians and reptiles. Proc. Pakistan Acad. Sci. Vol. 42(4),pp. 315-323. | Libermann Buchard (1959) : Giuen by King E.J. and Wolten I.D.P. micra analysis in method biochemistry, Churchill, London P. 42. | Patil M.U. Dr. Patole S.S. (2012): Effect of Malathion and Cypermethrin on Biochemical Constituents of Freshwater Fish, Lepidocephalichthys guntea (Ham-bach) International Indexed & Referred Research Journal Vol. IV (39). | Patole S.S. Patil M. and Mahajan R.T. (2008): Studies on metabolic changes during intoxication by phytotoxicants in fish Nemacheilus evizardy (Day) int. J. Pharmacol. Bio Sci. Vol.2:pp.63-68. | Rathod , D.S. M.V. Lokhunde and V.S. Shembekar (2009) : Toxic impact of dimethoate on the Biochemical composition of vital tissues of Fish Arias dussumieri. Shodh, Samiksha and Muyankan. Vol. 2, pp. 147-149. | Remia , K.M., S. Loguswamy , K. Logankumar and D. Rajmohan (2008) : Effect of an insecticide (Monocrotophos) on some biochemical constituents of the fish Tilapla massambica poll. Res . Vol.27(3) pp. 529-526. | Satyavardhan, K. (2010): Effect of fenvalerate TM on various tissues of Channa punctatus (Bloch). World Appl. Sci.J. Vol.10, pp 70-74.. | Shinde V.R. Veeresh M.U., and Kulkarni R.S. (2002): Ovarian changes in response to heavy metals exposure to the fish Notoperus notopterus (Pallas) J. Environ.Biol. Vol.23(2): pp.137-141. | Stalin Israel S, Sam Manohar Das. S. (2012): Biochemical changes in certain tissues of Cirrhina mrigala (Hamilaton (Cyprinidae :Cyprniformes) exposed to fenthion. Inter. J. of Environ. Sci. Vol.2, (3). | Venkataraman G.V. Sandhya P.N. and Murthy P.S. (2006): Impact of malathion on the biochemical parameter of gobiid fish Glossogobius giuris(Ham).J. Envi. Bio. Vol.27(1):pp. 119-122. |