EFFECT OF CHLORPYRIFOS IN GLYCOGEN CONTENT IN SOME ORGANS OF FRESH WATER FISH, CHANNA PUNCTATUS.

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A B S T R A C T

The fish is considered as a pioneer food for poor people. The fish is an edible organism constitutes mostly proteins. Chlorpyrifos is an organophosphate pesticide, which is mostly used to control pests in agriculture farms as well as orchards of fruit trees. This is one of the most used organophosphorus (OP) insecticides throughout the world until 2000, after its strong ill effect the United States Environmental Protection Agency banned some of its domestic uses due to its high toxicity. This pesticide is highly toxic both for flora and fauna, once enters into aquatic system bring multiple changes like alteration in the growth rate, nutritional value, behavioural pattern and biochemical composition in the organisms.

The lethal concentration was found to be 0.06 ml/L for 96 hrs. Under the laboratory condition the fishes were exposed to sub lethal concentration (i.e. 1/4th conc. of LC 50) for 24, 48, 72 and 96 hrs. So after pesticide exposure the glycogen content in muscle, gill, intestine and stomach was found to be declined rapidly. Therefore the rapid decrease in total glycogen content can disturb the metabolism due to the toxicity stress. In nutshell we can conclude that chlorpyrifos either in low or high concentration is very toxic to non target organism.

Keywords: Chlorpyrifos, Glycogen, *Channa* punctatus, Sub lethal Concentration

1. Introduction

The various pesticides include insecticides, herbicides, molluscides fungicides, and nematicides[1] are non-biodegradable and gets accumulate in food chain. Chlorpyrifos (O, O – diethyl O-3, 5, 6 trichloro-2-pyridyl-phosphorothioate) is widely used as organophosphate insecticide. The aquatic life including flora and fauna are in threaten due to sweeping of pesticides from agricultural fields, industrial and domestic sewage, and find their way into rivers, lakes and ponds[2] which cause the acute harmful effect on aquatic life. Use of chlorpyrifos has abundantly increased since its introduction in 1965(by Dow Chemical Company).Chlorpyrifos (CPF) is a toxic subject to long-term in vivo accumulation in different aquatic species throughout the world. The natural aquatic systems are the endmost recipient of the pollutants [3]. The acute and chronic toxic effects of chlorpyrifos in various fish species were widely studied [4]. Fishes are very sensitive towards the environmental contamination of water. So, these pollutants may damage certain physiological and biochemical processes into the organs of fish upon the entry of harmful substance [5]

Materials and Methods

In the present work a non-target organism (Channa Punctatus), fresh water fish a species of snakeheaded, found in Indian subcontinent. The fishs were brought from a local market in a Amravati region. Healthy specimens of size 16 ± 1 cms and weight 55 ± 3 gms. The fish were brought to the laboratory for experiment purpose and were treated with 0.1% KMnO4 solution to prevent them from dermal infection. The fishes were acclimatized to the laboratory condition for a period of 8 days. As the channa punctatus is a carnivorous organism. The food and feeding habit of fishes vary from season to season, hence various study has been done on time to time on the food and feeding habit of fishes from season to season by different

workers [6][7]. After the acclimatization the normal behavioural activity and good health conditioned fishes were selected for further experimental, injured and dead fishes were removed daily from the aquarium. The Chlorpyrifos, an organophosphorus pesticide was used and brought from local Agro- chemist shop in the vidarbha region Amravati. The toxic effect of chlorpyrifos at lethal concentration on *C. Punctatus* at different period of exposure, So, the fish were grouped into six groups and exposed to different concentrations viz. 0.04, 0.049, 0.05, 0.058, 0.06 and 0.069 ml/L for 96 hrs and the mortality of fishes was recorded. During the experiment fish were divided in to three groups, each group contained 12 fishes. 1st group is free from pesticidal experiment and is known as control, 2nd and 3rd group was experimental groups. Fish in the experimental groups were exposed to sub lethal concentration, i.e.,1/4th concentration of LC_{50} of chlorpyrifos for 24, 48, 72 and 96 hrs. After the exposure period comes on end the fish were sacrificed and particular organs were quickly removed in order to study biochemical parameter by, Anthrone method which determines the total glycogen content in tissues, [8]. To make a test sample (100 mg.) of tissue was homogenized in 1 ml of 30 % KOH and 2 ml of 96 % ethanol, the homogenate was centrifuged at 3000 rpm for 15 min and the supernatant was obtained in 0.5ml of supernatant, 0.5 ml of distilled water and 5 ml. of anthrone reagent was added. The optical density was measured in a UV spectrophotometer at 620nm. The glycogen content of the tissue was calculated using the OD of the unknown sample and that of the standard glucose solution.

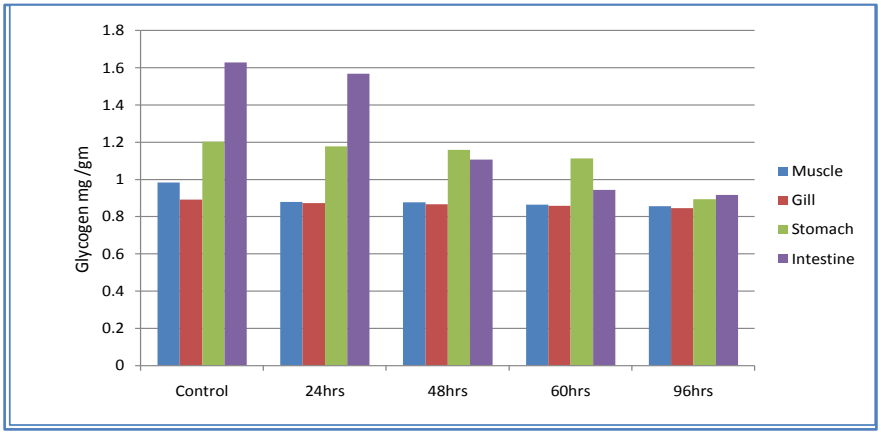
Mortality of *C.Punctatus* exposed to chlorpyrifos.

Table 3.1

No. Of fishes (Hrs)	Concentration ml/L	Eposure Period 24	48	72	96
14 1	0.04	N	N	1	
14 2	0.049	N	N	2	
14 3	0.05	N	1	3	
14 3	0.058	1	1	3	
14 4	0.06	2	2	4	
14 0	0.069	7	7	0	

Tissue	Control	24 hrs	48 hrs	72 hrs	96 hrs
Muscle	0.983 ±0.054	0.889 ±0.021	0.876 ±0.021	0.865 ±0.023	0.857 ±0.031
Gill	0.891 ±0.012	0.872 ±0.021	0.867 ±0.003	0.859 ±0.032	0.845 ±0.041
Stomach	1.202 ±0.001	1.177 ±0.002	1.158 ±0.010	1.113 ±0.018	0.894 ±0.034
Intestine	1.629 ±0.030	1.569 ±0.008	1.107 ±0.007	0.944 ±0.061	0.916 ±0.038

Graph



Exposure period

Result and Discussion

The LC_{50} determines 50% of the test organisms. Median lethal concentration (LC_{50}) is the most widely accepted basis for acute toxicity test and it is the concentration of a test chemical which kill 50% of the test organisms after a particular period of exposure, usually 96 hrs. Generally in toxicity tests, death is a decisive criterion because it is easy to determine and has obvious biological and ecological significance. The mortality of fishes at different concentrations viz. 0.04, 0.049, 0.05, 0.058, 0.06 and 0.069 ml/L of chlorpyrifos for 24, 48, 72 and 96 hrs. is shown in table A. It is clearly indicates that the LC50 value for chlorpyrifos at 96 hrs. was 0.05ml/L.

Prior to the exposure of 96 hrs. sub lethal concentration of chlorpyrifos, it was found that glycogen content is more present in stomach then in intestine , muscle and gill. So after the exposure, it was found that gradual depletion in stomach than intestine muscle and gill Fishes play an important role in monitoring, the presence of an unwanted substance in aquatic system [9]. Most of the chemicals pesticides including chlorpyrifos, acts as metabolic depressor in the surrounding environment and can cause pressure on biologically active molecules such as proteins, glycogen, carbohydrates and lipids[10]. So here due to the toxic effect of pesticide the fishes show various abnormal behavioral response for example increase in opercula movements, much more frequently jumping, rapid gill movement, vertical hanging, fading of body colour, lethargic and sluggish, These vary similar symptoms were observed in mosquito fish, *Gambusia affinis* in response to the sub-lethal exposure to chlorpyrifos.[11]

Conclusion

In the present study, we observed the abnormal behavioral consequences in the treated fish. The Chlorpyrifos, an organophosphorus pesticide was used as per doses on non-target organism during the study. The *channa punctatus* was used as non target organism and the significant alterations were observed during the exposure for 28, 48, 72 and 96 hours, respectively. After the exposure of chlorpyrifos, it was found that glycogen levels of vital organs like muscle, gill, intestine and stomach was significantly declined. Which pose serious threats to the aquatic environment as well as human life through food chain.

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