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Research Article

RESPONSES OF SUB LETHAL EXPOSURE TO THE PESTICIDE PROPARGITE INDUCED METABOLIC ENZYMATIC STRESS OF FRESH WATER FISH *CHANNA STRIATUS*

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ABSTRACT

The aim of study was to investigate effect of exposure to sub- lethal concentration of propargite, an organo sulphuric pesticide the oxidative enzyme glutamate oxaloacetate transaminase (GOT), glutamate pyruvate transaminase (GPT), lactate dehydrogenase (LDH), acid phosphates and alkaline phosphates in muscles, liver, kidney, and gill tissue estimation of propargite effects significantly (P>0.05) of a fresh water fish, *Channa striatus* were investigated. Fish were exposed to sub lethal concentration as 0.034 ppm, 0.102 ppm duration of 15 days and 30 days of propargite. As a result revealed that there GOT activity were increased in liver, kidney, gill and showed that muscle decreased. GPT and LDH activities were increased in muscle, liver, gill and kidney tissue significantly different in the propargite concentration of 0.034 ppm and 0.102 ppm of 30 days then compared to 15 days and control. A significantly ACP was observed decreased in liver, muscle, gill and kidney, but a significantly increase. ALP activity in muscle, liver, gill, and kidney significantly increase in the propargite concentration of 0.034 ppm and 0.102 ppm of 30 days then compared to 15 days and when compare to control respectively. In conclusion the result of present study suggests that of oxidative enzyme could be one of the muscle, liver, gills and kidney toxic effect of damage propargite. These alterations could be attributed to the changes in the metabolic pathways induced propargite pesticide in aquatic environment.

Keywords: Sublethal concentration propargite, Metabolic enzyme, *Channa striatus*.

INTRODUCTION

Agriculture to contain highly toxic substance of the pesticide, which can cause a hazardous effect to the aquatic environment the fish contamination of environment pesticides can affect the health and survival of non-target organisms (de Menezes *et al*., 2011; Saravanan *et al*., 2011). The pesticides, even when applied to restricted areas are washed and carried away by rains and floods to large water bodies like ponds and rivers and change the water chemistry (Waykar & Lomte, 2001).The emerging pollutants introduced into an aquatic environment by discharges from sewage treatment plants, industrial and hospital wastewater, landfill leachates, disposal of unused drugs, effluents from aquaculture, agriculture uses (Kasprzyk Hordern *et al*., 2009; Webb *et al*., 2003). In addition the oxidative stress caused by the deltamethrin also induces toxic effects in the physiological system of fish (Velisek *et al*., 2006; Yonar & Sakin, 2011). The chemicals include the following agrochemical, herbicides, pesticides halogenated polycyclic hydrocarbon and food additives. Industrializations and technological change process have to the introduction of hazardous chemicals in the environments (Nkolika & Benedict, 2010).

Enzyme activities have also been used as sensitive indicator of stress in fish exposed to diverse group of water pollutants and also to predict the possible level of threat to life (Kavitha *et al*., 2010). Alterations in enzyme activities can be easily measured even at low levels making it an important contributor of disease diagnosis. Several authors have reported that changes in enzyme activities reveal

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tissue damage in fish (Gabriel & George, 2005; Jayalakshmi *et al*., 2017; Osman *et al*., 2010; Pichaimani *et al*., 2017; Usha *et al*., 2017). The snakehead murrel, *Channa striatus* is an obligate air-breathing freshwater fish which inhabits all types of water bodies from small ditches to rice fields, rivers and lakes across tropical and subtropical Asian countries from Pakistan and India to Southeast Asia and Southern China (Hossain *et al*., 2008)., *C. striatus* is a commercially important species in Asia-Pacific region due to its tasty flesh, nutritional and medicinal properties (Banaee *et al*., 2008) and (Dhanaraj *et al*., 2008). Being a large-bodied fish species, it was essential to undertake long-term investigations linked to their physiological tolerances against dramatically depleted O_2 content in the water bodies, mimicking natural stress conditions. The short exposure to hypnotic conditions (Gamperl *et al*., 2004).

Newly, we recognized a laboratory-based hypoxia-stress-treatment protocol of the prolonged period in *C. striatus* (Mohapatra *et al*., 2013). Such experiment was in line with the fact that *C. striatus* is an air breathing fish that inhabits oxygen (O_2) deficient muddy and marshy water, this has provided an avenue to undertake laboratory (Chandra & Banerjee, 2004). Based investigations linked to behavioral and physiological adaptations against prolonged hypoxia-stress. (Baie & Sheikh, 2000) unpaid to its delicate taste and pharmaceutical value, especially for their duct ion of post natal and post surgery pain, it has high demand in the market. Aquaculture plays an important role in the production of economically important aquatic organisms (Wan shu *et al*., 2000). However, the risk of propargite reaching to the aquaculture environments by infiltrating through the soil is inversely correlated with organic substance amount in soil. While the propargite reaches to the water, it has been reported that, highly toxic for aquatic organisms (Erickson & Turner, 2002). In the present study aimed to investigate the toxicity and impact of propargite on certain enzymatic parameters of a freshwater fish *C. striatus* to fill up this lacuna. The selection this group is based on the fact among different groups of pharmaceuticals detected in the aquatic environment. In addition to the use for its pharmaceutical properties (Rahman *et al*., 2013). Fish responds to toxicants their enzyme activities and the inhibition of these enzyme activities has been used to indicate tissue damage (Webb *et al*., 2005).

The enzymes have been explored as potentials biomarkers for variety of different organisms because the parameters are highly sensitive and conserved between species and less variable. Aquatic ecosystem is the most diverse ecosystem in the world. The first life originated in the water and first organisms was also aquatic where water was the principal external as well as internal medium for organism (Vijayan *et al*., 2018). Among the enzymes are commonly used as a marker of pathological alterations of the organ, as they rapidly respond to chemicals. Glutamate oxaloacetate transaminase (GOT or AST), glutamate pyruvate transaminase (GPT or ALT) and lactate dehydrogenase (LDH) are the enzymes found in heart, liver, kidney, skeletal muscles and erythrocytes. GOT and GPT participate in transamination reactions. Likewise, LDH is an oxidative enzyme which is important for glycolytic activity. The alterations in these enzymes are used as organ health indicators of chemical exposure. GOT, GPT and LDH are widely used enzymological parameters in toxicology and in clinical chemistry to know the status of organs compensation are enzyme activities tend to be more sensitive, less variable, more highly conserved between species and to measure as stress indices (Agrahari *et al*., 2007). In aquatic organisms particularly in fish a validated approach for early warning of chemical (Van der Oost *et al*., 2003). During stress conditions fish change and their metabolic functions (Malarvizhi *et al*., 2012). Transaminases such as play a vital role in protein and carbohydrate metabolism (Webb *et al*., 2005). They GOT, GPT and LDH are widely used enzymological parameters in toxicology and in clinical chemistry to know the status of organs (Ramesh *et al*., 2014). It is involved in the interconversion of pyruvic acid and lactic acid and also serves as a pivotal enzyme between the glycolytic pathway and the tricarboxylic acid cycle (Tripathi & Verma, 2004). Phosphatases are mainly localized at cell membrane. Any damage in the cells may result in alteration in phosphatases activity. An acid phosphate is a lysosomal enzyme activity hydrolyses the phosphor-esters in acidic medium. Alkaline phosphates are osteoblastic activity and extra hepatic obstruction of biliary passage.

Many enzymes such as carboxyl esterase (CE), lactate dehydrogenase (LDH), alkaline and acid phosphates (ALP, ACP), glutamate oxaloacetate transaminase and glutamate pyruvate transaminase (GOT and GPT) are measured as useful biomarkers to determine cellular impairment and cell rupture (Malarvizhi *et al*., 2012). The metabolic enzymatic (GOT, GPT, and LDH) parameters in different tissues of *C. striatus.* Further, to use the alteration of pesticide in the aquatic environment. Propargite pesticide is highly toxic to fish even at recommend levels due to their persistence in the environment and bioaccumulation in the various organs of fish (Rahman *et al*., 2013).

MATERIAL AND METHODS

Collection and Maintenance of fish

The freshwater healthy fish *C. striatus* of the weight 22.34 ± 0.79 g and length 17 to 20 cm were selected for the experiment and were collected from fish farm and around Thanjavur. Fish was screened for any pathogenic infections. A Glass aquarium was washed with 1% KMnO4 to avoid fungal contamination and then sun-dried. The fishes were maintained in 300 L tank containing dechlorinated tap water (Temperature 26°C). Fish was acclimated to laboratory conditions for 15 to 30 days prior to experimentation. They were regularly fed with

commercial food and the medium (tap water) was changed daily to remove fasces and food remnants.

Toxicant

Propargite is one of the organo sulphiric insecticides extensively used in agriculture. Chronic and sub-lethal level 2- (4-tert-butyl phenoxy) cyclohexyl prop-2-ynyl sulphite is a non-systemic insecticide. The sub-lethal concentrations of propargite were applied exposure duration was 15-30 days the water and propargite were completely replenished each day during experimental period.

Experimental design

The insecticide used in this experiment was propargite was purchased from Thanjavur, Tamilnadu, India. The Propargite insecticide was used only for the present experiment. The experimental group was vulnerable to a sub lethal concentration of the insecticide (0.34 ppm L-1) 1/10, 1/30 during 15 and 30 days. Toxicity tests carried out in accordance with in standard methods (APHA, 1998). A stock solution of propargite with a concentration of 1g per liter (equivalent to 1 ppm) was prepared in distilled water and different dilutions were prepared by adding the required amount of distilled water. Based on the progressive bisection of intervals on a logarithmic scale, log concentrations were fixed after conducting the range-finding test. The fishes were starved for 24 hours prior to their use in experiments as recommended by storage, to avoid any interference in the toxicity of pesticides by excretory products. After the addition of the toxicant into the test tank with 10 liters of water having ten fish, mortality was recorded after 24, 48, 72 and 96 hours. Ten replicates were maintained simultaneously.

Sub-lethal concentration

Based on acute toxicity test (96h LC_{50} 0.34 ppm) sub-lethal concentrations 1/10and 1/30 (0.034ppm and 0.102ppm of 15 & 30 days) were derived from propargite which served as the experimental concentration of the propargite in the subsequent experiments. Ten fish were exposed to each concentration for a period of 15 and 30 days. Control batch was maintained simultaneously.

Preparation of tissue sample

After each exposure period, tissues such as liver, gill, muscle, and kidney were dissected and removed. The tissues (10 mg) were homogenized in 80% methanol, centrifuged at 3500 rpm for 15 minutes and the clear supernatant was used for the analysis of enzymological parameters (ALP, ACP, GOT, GPT and LDH).

Determination of GOT, GPT and LDH activity

Quantitative estimation of GOT in the sample was done following the methods of (Reitman & Frankel, 1957). Glutamate oxaloacetate aminotransferase (GOT) the enzyme activities were calculated using the standard cure and expressed in IU/L of sample. Theoxalo acetic acid was measured colorimetrically by a reaction with 2, 4 dinitro phenyl hydrazine after the addition of 0.4 N sodium hydroxide. The intensity of the colour developed was measured after incubating for 15 minutes at wave length 505 nm (or) green filter. The procedure adopted for the estimation of Glutamate pyruvate transaminase (GPT) was the same as for the GOT except that the substrate used here was alanine and the inoculation period allowed was 30minutes.The values in the both the cases were expressed as IU/L.LDH activity was measured according to the method of Enzyme activity was converted to LDH units, by standard curve and expressed in IU/L.

Determination of ACP and ALP activity

Acid phosphatase (ACP) activity in liver, muscle, kidney, and gill was measured by the method of Jabeen, and the inorganic phosphate (Pi) liberated was measured by the method of Fiske and Subbarow. The enzyme activity was expressed as mol pi liberated/mg protein/h. The activity of alkaline phosphatase (ALP) in gills, liver, kidney, and muscles was estimated by the method of Kind, PRN, and (King & Jegatheesan, 1959).

Statistical Analysis

All the data were subjected to one way ANOVA using statistical software of SPSS version 16.0. Duncan's Multiple Range (DMRT) test was used to determine the difference among treatment means at 5% level of significance.

RESULTS AND DISCUSSION

Aquatic toxicology was the effect of environmental contamination on aquatic animals, such as the effect of pollution on the health fish or other aquatic organisms. During sub lethal concentration of treatment groups in GOT activity of liver, gill and kidney were slightly significantly ($P>0.05$) increased in the propargite concentration of 0.102 ppm of 30 days (80.70 ± 0.88, 46.55 ± 0.74, 85.37 ± 0.88) while compared to another concentration of 0.034 ppm 15 days (62.60 ± 0.75, 25.56 ± 0.74, 52.60 ± 0.74) when compared to control and muscle were decreased in treated group 0.102 ppm of 30 days (25.35 ± 0.88) then compared to other treated groups and control respectively (Table 1-4).

The GPT activity was observed in similarly a significantly ($P>0.05$) increased in the propargite treatment groups liver, muscle, gill, and kidney tissue 0.102 ppm 30 days (78.64 ± 0.75, 76.80 ± 0.89, 44.37 ± 0.87, 45.36 ± 0.87) while compared to another treatment groups 0.034ppm 30 days (64.42 ± 0.71, 78.46 ± 0.75, 24.53 ± 0.84, 20.52 ± 0.76) when compared to other treated groups and control (Table 1, 2, 3 and 4) respectively. The changes in LDH activity such as similarly a significantly ($P>0.05$) increased in gill, muscle, kidney, and liver tissues in all treatment groups 0.102 ppm 30 days (159.70 ± 0.87, 132.58 ± 0.98, 112.39 ± 0.88, 93.40 ± 0.88) however all treated

group 0.034 ppm 30 days (120.85 ± 0.94, 115.40 ± 0.88, 85.54 ± 0.76, 88.20 ± 0.94) when compared to other treated groups control respectively (Table 1-4). Initially acid phosphates and alkaline phosphates activities in the propargite concentrations acid phosphates were significantly increased gill, muscle tissue 0.102 ppm 30 days (1.152 ± 0.01, 0.628 ± 0.01) in kidney and liver reduced(0.840 ± 0.03,0.443 ± 0.04) when compared to control respectively (Table 1-4). In comparison to control, similarly a significantly were increased alkaline phosphates muscle, gill, kidney and liver 0.102 ppm 30 days (0.932 ± 0.02, 0.952 ± 0.01, 0.768 ± 0.06, 0.330 ± 0.02) when compared to another treatment groups and control respectively (Table 1, 2, 3 and 4).

Table.1 Enzymatic alterations in muscle of *Channa striatus* exposed to sub lethal concentration of propargite.

MUSCLE					
Treatment	Control	Propargite 0.034 ppm 15 days	Propargite 0.034 ppm 30 days	Propargite 0.102 ppm 15 days	Propargite 0.102 ppm 30days
SGOT(IU/L)	64.57 ± 0.75[a]	50.37 ± 0.94 [b]	45.87 ± 0.87 [c]	28.34 ± 0.76 [d]	25.35 ± 0.88 [e]
SGPT(IU/L)	45.98 ± 0.83[e]	50.53 ± 0.74 [d]	67.20 ± 0.94 [c]	75.30 ± 0.98 [b]	78.64 ± 0.75 [a]
LDH(IU/L)	86.42 ± 0.87 [e]	108.55 ± 0.76 [d]	115.40 ± 0.88 [c]	124.56 ± 0.76 [b]	132.58 ± 0.98 [a]
ACP(IU/L)	0.354 ± 0.01[e]	0.884 ± 0.02 [b]	0.852 ± 0.01 [a]	0.688 ± 0.02[c]	0.628 ± 0.01 [d]
ALP(IU/L)	0.434 ± 0.01[e]	0.657 ± 0.02 [d]	0.732 ± 0.03 [c]	0.852 ± 0.03 [b]	0.932 ± 0.02 [a]

Values are given as mean ± SE and values in each group. Values not sharing a common marking (a, b, c, d) different alphabets in vertical rows differ significantly at p< 0.05 (Duncan's Multiple Range Test (DMRT).

In the present study the significantly increase GOT and GPT activity in sub lethal exposure might have resulted from the organ damage due to propargite. The response to views enzyme activities to stress may occur via. Direct enzyme inhibitions or induction and changes in metabolic pathways or fluxes. Enzyme activities affect various chemical and biological reactions in the body of fish according to (Gabriel & George, 2005). Van der Oost *et al*. (2003) recommended that, the activities of GOT and GPT can be used as a sensitive indicator to assess constant very minute cellular damage. The observed similar results GOT and GPT increase in Muscle, liver, gill, and kidney. Suggested that the energy demand is met be gluconeogenesis the elevation in transaminases activity can be effectively used as biomarkers of methyl parathion toxicity in fish. Agrahari *et al*. (2007) also reported that increase in GOT and GPT activity in monocrotophos treated fish *Channa punctatus* indicates liver damage. The role of protein in the energy production during toxicant stress observed enzyme activity especially is planned to increase AST and ALT in gill, liver, kidney assumed (Yildirim & Asma, 2010) found that exposed to *Oreochromis niloticus* to deltamethrin.

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Table 2. Enzymatic alterations in Liver of *Channa striatus* exposed to sub lethal concentration of propargite

LIVER					
Treatment	Control	Propargite 0.034ppm 15 days	Propargite .034ppm 30 days	Propargite 0.102ppm 15 days	Propargite 0.102ppm 30days
SGOT(IU/L)	56.80 ± 0.76[d]	62.60 ± 0.75[c]	68.57 ± 0.58 [b]	73.42 ± 0.87 [b]	80.70 ± 0.88[a]
SGPT(IU/L)	59.80 ± 0.75[c]	62.55 ± 0.75 [d]	64.42 ± 0.71 [b]	70.59 ± 0.77 [a]	76.80 ± 0.89 [a]
LDH(IU/L)	65.28 ± 0.94[c]	82.85 ± 0.69 [b]	88.20 ± 0.94 [b]	91.56 ± 0.76 [a]	93.40 ± 0.88 [a]
ACP(IU/L)	0.967 ± 0.02[a]	0.752 ± 0.03 [b]	0.684 ± 0.03 [c]	0.595 ± 0.01 [d]	0.443 ± 0.04 [c]
ALP(IU/L)	0.119 ± 0.02[a]	0.278 ± 0.02 [b]	0.226 ± 0.03 [c]	0.142 ± 0.01 [d]	0.330 ± 0.02 [c]

Values are given as mean± SE and values in each group. Values not sharing a common marking (a, b, c, d) different alphabets in vertical rows differ significantly at p< 0.05 Duncans Multiple Range Test (DMRT).

Bernet *et al*. (2001) also showed that there GPT and GOT damage in liver, gill, kidney, and gill is evident from elevated transaminase activity. Tamizhazhagan & Pugazhendy, (2016) Reported that the elevation in the GPT and GOT activity of the fish treated with pesticide might have been increased depending on anerobic carbohydrate metabolism cumulative effect or possibly to meet the increased energy demands under sustained and prolonged toxic stress of pesticide monocrotophos. In this study there were decreases of GOT activity in indicate the under

pesticide stress. Bernet et al. (2001) suggested that GOT activity in elevation due to indicate muscle especially cardiac muscle damage. Decreased in the GOT indicates disturbance in the structure and integrity of cell organelles. In the present study the sub lethal exposure might have resulted significantly increase LDH activity in the organ damage due to propargite.LDH is a vital tetrameric glycolytic enzyme and recognize as a potential marker for assessing the toxicity of tissue damage inducible with oxygen stress (Diamantino *et al*., 2001). This study shows that in propargite treated fish the activity of LDH muscle, liver, gill, and kidney was increased. Several reports Jos *et al*. (2003) revealed that leakage of LDH is a marker of membrane permeability and cell death. They also suggested that may be due to stabilizations of cytoplasmic membrane and good possibility of the cultures exposed to Carbamazepin. Similarly in CBZ treated rainbow trout *Oncorhynchus mykiss* enzyme like LDH and GPT levels were increased during chorinc exposure.

This might be due to the change in mitochondrial membrane junction or it may be due to impaired glycolysis (Yadav *et al*., 2007) reported that fertilizer industry effluent caused marked reduction in tissue LDH activity in *Channa striatus* (Simon, Nemcsok, & Boross, 1983) found that the increase in LDH level indicates metabolic changes that are the glycogen catabolism and glucose shift towards the formation of Lactate in stressed fish, primarily the muscle tissue. (Chen *et al*., 2000) observed a significant rise in serum LDH activity after liver infection. LDH level which indicates the energy demands are met by anaerobic respiration through increase in LDH activity. Reported that increase in LDH activity in the kidney as reported earlier as significant increase in LDH activity in the fish, *Cyprinus carpio* exposed to insecticides (Singh & Singh, 2004) demonstrated an increase in LDH activity of liver, brain, gill and skeletal muscle of *C. carpio* exposed to alphamethrin. Elevated level of LDH in *C. punctatus* in response to alphamethrin indicated an increase in anaerobic respiratory activity and production of more lactate for completion of metabolic process. In the present study the sub lethal exposure might have resulted significantly increase ACP and ALP activity in the organ damage due to propargite. ACP acts as marker enzyme for the detection of lysosomes in cell fractions and can be altered by the presence of xenobiotics.

Table 3. Enzymatic alterations in gill of *Channa striatus* exposed to sub lethal concentration of propargite.

Treatment	Control	Propargite 0.034ppm 15 days	Propargite 0.034ppm 30 days	Propargite 0.102ppm 15 days	Propargite 0.102ppm 30days
SGOT(IU/L)	18.55 ± 0.75^{e}	25.56 ± 0.74^{d}	31.03 ± 0.56^{c}	41.33 ± 0.92^{b}	46.55 ± 0.74^{a}
SGPT(IU/L)	13.50 ± 076^{e}	17.10 ± 0.88^{d}	24.53 ± 0.84^{c}	34.20 ± 0.94^{b}	44.37 ± 0.87^{a}
LDH(IU/L)	97.55 ± 0.75^{e}	114.64 ± 0.93^{d}	120.85 ± 0.94^{c}	135.56 ± 0.73^{b}	159.70 ± 0.87^{a}
ACP(IU/L)	0.628 ± 0.04^{c}	0.689 ± 0.06^{c}	0.701 ± 0.06^{c}	0.948 ± 0.01^{b}	1.152 ± 0.01^{a}
ALP(IU/L)	0.542 ± 0.03^{d}	0.639 ± 0.04^{c}	0.768 ± 0.05^{b}	0.832 ± 0.04^{b}	0.952 ± 0.01^{a}

Values are given as mean± SE and values in each group. Values not sharing a common marking (a, b, c, d) different alphabets in vertical rows differ significantly at $p< 0.05$ (Duncan's Multiple Range Test (DMRT).

Table 4. Enzymatic alterations in kidney of *Channa striatus* exposed to sub lethal concentration of propargite.

Treatment	Control	Propargite 0.034 ppm 15 days	Propargite 0.034 ppm 30 days	Propargite 0.102 ppm 15 days	Propargite 0.102 ppm 30 days
SGOT(IU/L)	35.37 ± 0.87^{e}	52.60 ± 0.74^{d}	65.37 ± 0.71^{b}	55.26 ± 0.94^{c}	85.37 ± 0.88^{a}
SGPT(IU/L)	16.55 ± 0.87^{d}	25.60 ± 0.75^{b}	20.52 ± 0.76^{c}	18.56 ± 0.73^{c}	45.36 ± 0.87^{a}
LDH(IU/L)	63.34 ± 0.88^{e}	92.56 ± 0.75^{b}	85.54 ± 0.76^{c}	74.31 ± 0.60^{d}	112.39 ± 0.88^{a}
ACP(IU/L)	0.906 ± 0.03^{a}	0.652 ± 0.06^{c}	0.758 ± 0.04^{b}	0.590 ± 0.05^{c}	0.840 ± 0.03^{b}
ALP(IU/L)	0.462 ± 0.05^{c}	0.517 ± 0.03^{b}	0.582 ± 0.05^{b}	0.690 ± 0.05^{a}	0.768 ± 0.06^{a}

Values are given as mean± SE and values in each group. Values not sharing a common marking (a, b, c, d) different alphabets in vertical rows differ significantly at $p< 0.05$ (Duncan's Multiple Range Test (DMRT).

In this study ACP of increases muscle, gill decrease of liver, kidney observed the elevated level of serum alanine transaminase and alkaline phosphate in the fish, on exposure to Carbofuran. The decrease in ACP activities in the liver reflects a possible decrease in biosynthetic activities and anaerobic capacity of fish (Tripathi & Verma, 2004). The elevation in liver hepatic toxin causing degeneration and necrosis of parenchyma cells ALP is a

membrane bound enzyme of liver damage causing accelerated membrane transport function related to hydroxide exchange across lipid bio membranes (Altinok & Capkin, 2007). Inhibition of ALP reflects alteration in protein synthesis and uncoupling of oxidative phosphorylation. Inferred that severe acidosis may be responsible for inhibition of alkaline phosphatase. This in chance could be adoptive for fish to meet the energy demand via anaerobic breakdown of glycogen. The increase in alkaline phosphatase in the kidney it may be possible that there is hyper synthesis of ALP to facilitate transport and excretion of phosphate ions resulting in the noted increase in the ALP activity.

CONCLUSION

The present of this study concludes that the exposure of acute and sub lethal concentrations of has significantly enzymological (GOT, GPT, LDH and ACP, ALP) responses. The effect study report is a highly toxic pesticide to *C. striatus* and presence of propargite even at very low concentrations in the aquatic environments may cause harmful effects on aquatic organisms. The parameters studied in this study could be used as potential biomarkers in assessing toxic effects of and also other pesticides. The findings of the present study can as certain a safer level of these propargite insecticides in the aquatic environment of aquatic habitants.

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