

# EFFECT OF AQUATHOL – A WEEDICIDE ON PLASMA AND TISSUE PROTEIN LEVEL IN *Heteropneustes fossilis* .

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## ABSTRACT

The Aquathol is quite effective against *Hydrilla verticillata* – a very common weed in Indian ponds. This chemical causes severe damage to aquatic ecosystem especially to fishes. The aim of this study is to evaluate the impact of aquathol on Plasma and tissue proteins levels in *Heteropneustes fossilis*. The LC<sub>50</sub> Value for 96 hours was calculated following probit analysis method. Fishes exposed to various sublethal concentrations of aquathol (0.5 ppm, 1.0 ppm, 1.5 ppm and 2.0 ppm) elicited hypoproteinemia in blood, liver and muscle with the increase of concentration as well as the increasing time-intervals, i.e. from 24 hours upto 96 hours. The induction of hypoproteinemia in the plasma and muscle of the treated fish are indications of dysfunctional protein physiological processes occurring in the fish due to aquathol exposure. *The result indicated that primextra had adverse effect on the tissue protein levels in H.fossilis. When compared with the control, the muscle and plasma protein levels decreased significantly (P>0.05 and p>0.01) due to aquathol exposure.*

## INTRODUCTION

The contamination of aquatic ecosystem with a wide range of pollutants has become a matter of great concern, not only because of the threat to public water supplies, but also with the damage caused to the aquatic life (Vander Oost et.al., 2003). The water contamination causes damage to aquatic life especially to fishes which are very sensitive to wide range of toxicant in the water (Herger, W et.al.1995). Since the blood is the most important fluid in animals reflecting the physiological condition, the blood study is now-a-days widely used to identify the toxic impact of pollutants (Lakshmanan et.al.,2013)

## Material and Method

Weedicide, AQUATHOL [7-Oxabicyclo (2,2,1) heptane 2,3- dicarboxylic acid] in the present work was used because it was found to be quite effective against *Hydrilla verticillata* – a very common weed in Indian ponds. The maximum concentration of Aquathol which was selected here i.e., 2 ppm is sub-lethal concentration and below the maximum recommended dose (3 to 5 ppm) for the eradication of rooted weeds.

*Heteropneustes fossilis* commonly known as ‘Singhi’ belonging to the order Cypriniformes and family Saccobranchidae was used as an experimental animal. Live and healthy specimens were collected from local freshwater sources or from the fish market. Their average length and weight ( $\pm$  SD) were recorded as  $34 \pm 2$  cm and  $75 \pm 4$  gms respectively.

Fishes were treated with 0.1 %  $\text{KMNO}_4$  solution for 2 min. to avoid any dermal infection. The fish stock was then maintained in 100 liter glass aquaria for 14 days to acclimatize under laboratory condition. The fishes were fed with pellets of wheat and ground dried shrimp .

The  $\text{LC}_{50}$  value for 96 hours of Aquathol was determined by the procedure of Finney (1971). The  $\text{LC}_{50}$  of aquathol for 96 hours for *Heteropneustes fossilis* was 6 mg/liter. Fishes were exposed to sublethal concentration (2 ppm) of aquathol, simultaneously control group was also maintained. After 96 hours of exposure to weedicide blood was collected from the cauda-dorsalis of both control and treated groups.

Collection of blood : Fish was taken out of aquarium and kept in dissecting tray . The head part of the fish was covered with a piece of cloth and was caught with a very little pressure to avoid any stress on the fish . The line of lateral-line system was located and the needle of a dry 2 ml syringe ,rinsed with 3.8% solution of sodium citrate ( an anticoagulant) was pierced gently into the muscle of the fish and was introduced gently into the lumen of cauda-dorsalis running just below the vertebral column keeping the syringe ventrally at an angle of  $45^\circ$ .

- The Plasma protein was estimated by Biuret method as described by Varley (1980).
- The muscle protein was estimated by the method as described by Sutherland et. al. (1949) using folin folinicalteau reagent.

## Results and discussion

*Heteropneustes fossilis* exposed to various sublethal concentration of the weedicide, aquathol i.e. 0.5ppm, 1.0ppm, 1.5ppm and 2.0 ppm for different period (24 hours, 48 hours, 72 hours and 96 hours) have exhibited varieties of anomalies in different biochemical parameters. The impacts of aquathol on the plasma protein and muscle protein have been depicted in Table 1. The protein level (g/100 ml) exhibited a gradual and significant decrease with the increasing concentration of aquathol as well as the increasing times of exposure as compared to the control values.

The blood plasma protein (g/100 ml) showed decreasing trend with the increasing concentrations of aquathol together with the increasing time intervals i.e. 24 hours, 48 hours, 72 hours and 96 hours as compared to their control values (Table 2, fig ). However, the significant decline was recorded at highest concentration of aquathol i.e. 2.0 ppm exhibiting lowest values.

Muscle protein (g/100 mg wet weight) also followed more or less similar trend to that of the plasma protein and significant decline was observed at higher concentration (1.5 ppm and 2.0 ppm) and greater duration of exposure.

Present investigation clearly evidences that a higher energy demand would have stimulated increased catabolism of proteins in the blood of present experimental fish for the production of required energy, thereby reducing the plasma and muscle proteins. It is also found that a high proteolytic activity or increased production of protease enzyme or impaired protein synthesis could cause decrement in protein content in tissues of fish under stress ( Nagaraju B,et.al.,2013 and Baise UE,2012) .The similar decrease in protein content was also recorded by Stepanowska et al ., (2006), Kumar et al (2007),Srivastava and Verma (2009).

## CONCLUSION

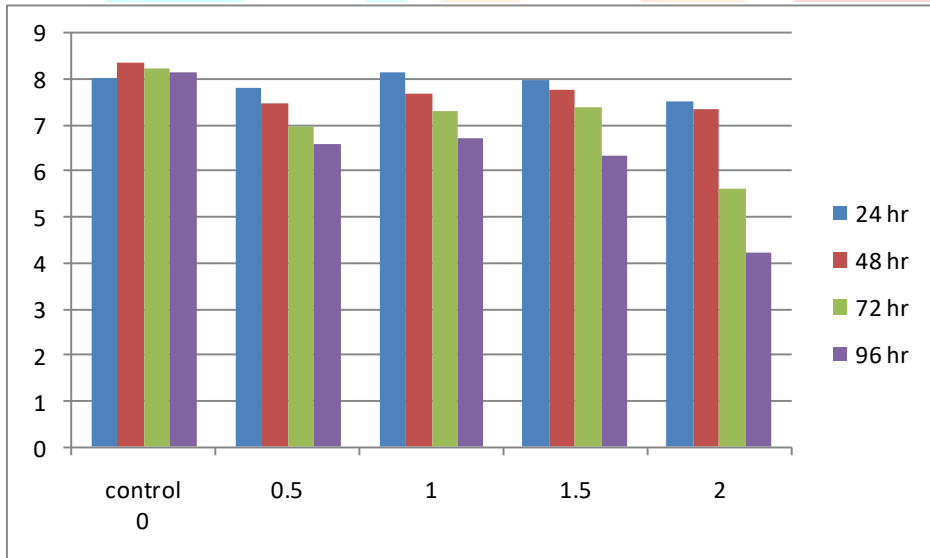
The biochemical alterations led to the conclusion that the weedicide Aquathol has toxic effects on the species *H.fossilis*, and that its presence in the environment may jeopardize the health of these animals .

Table –1. showing impact of various concentrations of Aquathol on plasma protein and muscle protein on *H.fossilis* at different hours of exposure (n=10 animal in each group;  $\pm$ SE).

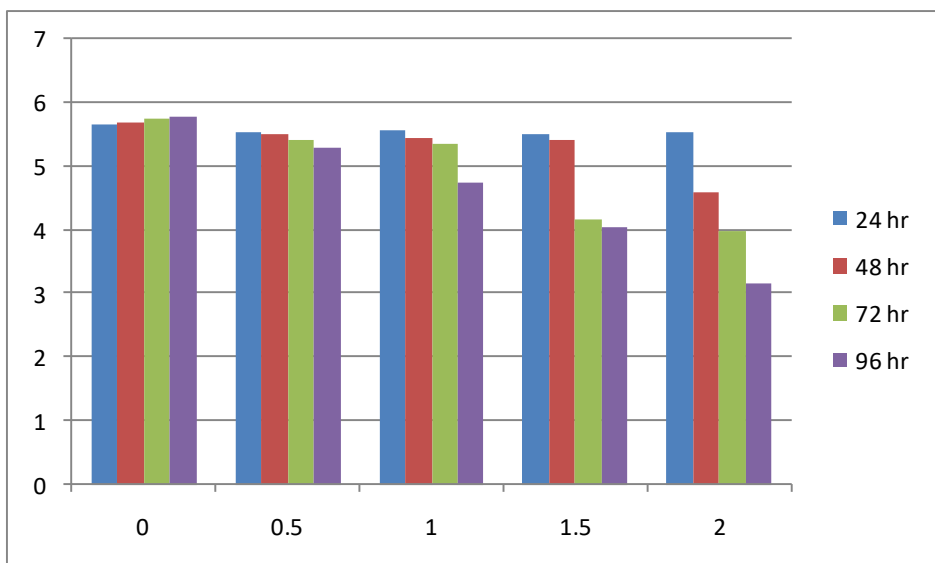
Parameters	Treatment Group(PPM)	Duration of Exposure (in Hours)			
		24hr	48hr	72hr	96hr
Plasma Protein (g/100ml)	0	8.010 $\pm$ 0.12	8.363 $\pm$ 0.16	8.245 $\pm$ 0.13	8.175 $\pm$ 0.14
	0.5	7.815 $\pm$ 0.11	7.463 $\pm$ 0.13	6.955 $\pm$ 0.12	6.601 $\pm$ 0.15*
	1.0	8.163 $\pm$ 1.18	7.680 $\pm$ 0.14	7.296 $\pm$ 0.16	6.725 $\pm$ 0.14*
	1.5	7.969 $\pm$ 0.16	7.759 $\pm$ 0.17	7.385 $\pm$ 0.13	6.323 $\pm$ 0.12*
	2	7.531 $\pm$ 0.13*	7.360 $\pm$ 0.14*	5.619 $\pm$ 0.04**	4.231 $\pm$ 0.86**
Muscle Protein (g/100 ) (weight wet)	0	5.663 $\pm$ 0.02	5.701 $\pm$ 0.04	5.743 $\pm$ 0.08	5.777 $\pm$ 0.01
	0.5	5.550 $\pm$ 0.24	5.496 $\pm$ 0.56	5.427 $\pm$ 0.38	5.301 $\pm$ 0.49
	1	5.558 $\pm$ 0.14	5.461 $\pm$ 0.16	5.345 $\pm$ 0.13	4.753 $\pm$ 0.96*
	1.5	5.511 $\pm$ 0.03	5.413 $\pm$ 0.04	4.173 $\pm$ 0.84*	4.054 $\pm$ 0.76*
	2	5.546 $\pm$ 0.16	4.608 $\pm$ 0.28*	3.991 $\pm$ 0.76**	3.153 $\pm$ 0.87**

\* at 0.5 and \*\* at 0.01 level.

Graph-1: showing impact of various concentrations of Aquathal on plasma protein and muscle protein on *H.Fossilis* at different hours of exposure (n=10 animal in each group;  $\pm$ SE).



Graph – 2: showing impact of various concentrations of Aquathal on muscle protein on *H.Fossilis* at different hours of exposure (n=10 animal in each group;  $\pm$ SE).



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