



## Short term effect of p-nonylphenol (p-NP) on serum metabolites of snake head fish, *Ophiocephalus punctatus* (Bloch, 1793)

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### ABSTRACT

Surfactant p-NP found to affect the survival of snakehead fish, *Ophiocephalus punctatus* at LC-50. The organic metabolites such as protein, cholesterol and glucose showed significant changes during short term exposure to p-NP. All the organic metabolites in the serum were found increased significantly from the very first day to fourth day of exposure. This increase in the serum organic metabolites may be due to increase in the rate of metabolism in the liver. Increase in glucose indicates induction of glycogenolysis in the liver and increase in the cholesterol and protein could be due to endocrinal disruption.

**Key words:** Nonylphenol, fish, organic metabolites

### INTRODUCTION

Agricultural and industrial revolutions have brought tremendous positive changes all over the world but to the other hand they happened to cause varieties of threat to all kind of living organisms. P-NP is one of the notorious xenobiotic compounds and is known for its xenoestrogenic behavior. There are number of sources that release xenobiotic compounds into the water that cause endocrinal dysfunction in the aquatic vertebrates. However, very meagre works have been found to be carried out with respect to effect of p-NP on organic metabolites in fresh water fish.

### MATERIALS AND METHODS

In bulk, healthy fingerlings of *O. punctatus* purchased from Mulchera (District-Gadchiroli) and acclimatized for fortnight in the laboratory. Two tanks were raised containing twenty fish each. One tank treated as control and other experimental, containing 15.51 ppm p-NP (p-NP LC-50). Fish were exposed consistently for four days and after twenty four hours of exposure four fish were removed from the water and anesthetized by using clove oil. From the heart itself blood was collected in heparinized vial and centrifuged at 1000 rpm to get serum. Biochemical estimation was done by using standard methods and calculation was performed using graph pad.

### RESULTS AND DISCUSSION

In the present work, serum metabolites studied were total protein, cholesterol and glucose. The p-NP LC-50 for fish *O. punctatus* was calculated to be 15.51 ppm (Khandale et al., 2015). Fish exposed to p-NP LC-50 were showed significant changes in total protein, cholesterol and glucose which is as follows:

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**Table-1: Showing change in Serum total protein, cholesterol and glucose of *C. punctatus* exposed to p-NP LC-50.**

Sr. No.	Concentration of p-NP	Metabolites	Time of Exposure			
			24-Hrs	48-Hrs	72-Hrs	96-Hrs
1.	Control	T.Protein gm/dl	4.13 ± 0.023	4.16±0.097	4.06±0.566	4.13±0.118
	LC-50		4.41±0.072	4.66±0.088	4.84±0.052	4.93±0.049
2.	Control	Cholesterol mg/dl	204.8±5.59	205.2±7.66	209.4±4.561	202.6±7.50
	LC-50		214.4±3.78	223.2±4.49	232.6±6.19	244.2±5.26
3.	Control	Glucose Mg/dl	66.60 ± 2.074	66.20 ± 1.294	66.40 ± 1.342	66.20±1.562
	LC-50		71.6±4.615	72.4±2.191	73.2±4.869	73.6±2.191

All the above experimental values are significant, P<0.05

Total serum protein in normal fish (un-exposed) was recorded in the range of  $4.06 \pm 0.566$  to  $4.16 \pm 0.097$  gm/dl from 24h to 96h. On short term exposure to p-NP LC-50, total serum protein consistently and significantly increased from 24h to 96h. The maximum increase ( $4.93 \pm 0.049$  gm/dl) of total serum protein was recorded at 96h which was highest of all four days of exposure (Table-1).

Proteins are very important organic metabolites perform multidimensional functions in the living system such as involvement as an enzymes, hormones and antibodies. Total protein is the biomarker of hepatic damage though it does not show consistency in either increase or decrease in its concentration (Mekki et al. 2010). In the present study, serum protein significantly increased at constant p-NP concentration with extended time of exposure.

In the control *O. punctatus*, serum cholesterol was measured in the range of  $202.6 \pm 7.50$  to  $209.6 \pm 4.561$  mg/dl. When the fish was exposed to p-NP LC-50, serum cholesterol significantly increased from very first day ( $214.4 \pm 3.78$  mg/dl) to fourth day of exposure. However, maximum cholesterol ( $244.2 \pm 5.26$  mg/dl) was noticed particularly on 96h of exposure (Table-1).

Metabolic factory liver is a vital organ for maintaining the lipid homeostasis. In the present study, consistent increased in the concentration of serum cholesterol upon exposure to p-NP for four days as compared to control is an indication of hepatic malfunctioning. Sayed et al. (2011) also proved to increase blood cholesterol in African catfish, *Clarias gariepinus* on exposure to varying concentrations of p-NP.

The glucose in the serum of controlled fish was estimated to be  $66.20 \pm 1.294$  to  $66.60 \pm 2.074$  mg/dl. On short term exposure to p-NP LC-50 glucose concentrations gradually increased from 24h to 96h (Table-1). Consistently significant increase ( $P < 0.01$ ) in serum glucose was observed from 24h ( $71.6 \pm 4.615$  mg/dl) to 96h ( $73.6 \pm 2.191$  mg/dl) of exposure.

Blood glucose is the instant source of energy to be utilized in all sorts of tissues. Increase in the level of blood glucose leads to its conversion into glycogen to the large extent in the liver and muscle and to the little in rest of the tissues. However on increased demand of glucose elsewhere in the body facilitates glycogenolysis in the liver to make available free glucose that is supplied to needy cells and tissues in the body through

blood. Significant increase in serum glucose as compared to control was recorded in *O. punctatus*. Osman et al. (2010) reported to modulate carbohydrate metabolism by chemical pollutant that led to hyperglycemia by stimulating glycogenolysis in fish.

## CONCLUSION

Increase in concentration of serum protein could be due to increase in metabolic activity in the body. Cholesterol got shoot up consistently might be due to its synthesis and not getting converted into other steroidal products. Elevation in serum glucose level could be due to glycogenolysis and pancreatic dysfunction. Thus, metabolic alteration can be credited to p-NP causing endocrinal dysfunction.

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## Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

## References

- [1].A.E.H.Sayed, I.A.A. Mekki and U.M. Mahmoud, Afr. J.Biochem. Res., 2011, 5(9), 287-297.
- [2].D.P.Khandale, N.A.Adbale, P.J.Khinchi and A.M.Chilke, Poll.Res.34(3), 119-122.
- [3].G.M. Osman, M. Kautb and A.H.Sayed, 2010, J. Photoch. Photobio. B. 99, 1-8.
- [4].I.A.A. Mekki, U.M. Mohmoud and A.H. Sayed, Fish Physiol. Biochem., 2010, 37-71-84.