



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

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 pad47 patients subjected to penetrating brain injury and admitted to the Emergency Department (ED) of Alexandria Main University Hospital from March 2014 to February 2016. This study includes isolated penetrating traumatic brain injured patients either missile or non-missile injuries admitted within 48 hours of trauma.

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cause endocrinal dysfunction in the aquatic vertebrates. However, very meagre works have been found to be

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

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:

Total serum protein in normal fish (un-exposed) was recorded in the range of 4.06 ± 0.566 to 4.16 ± 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 ± 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 ± 7.50 to 209.6 ± 4.561 mg/dl. When the fish was exposed to p-NP LC-50, serum cholesterol significantly increased from very first day (214.4 ± 3.78 mg/dl) to fourth day of exposure. However, maximum cholesterol 244.2 ± 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 ± 1.294 to 66.60 ± 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 ± 4.615 mg/dl) to 96h (73.6 ± 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 conversation 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.

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