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Effect of Phosphamidon on Haematological and Biochemical parameters in freshwater fish *Labeo rohita*

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Abstract
Chronic effects of Phosphamidon pesticide on freshwater fish *Labeo rohita* for 15 days exposure were analyzed. Decreased RBC, WBC count and Haemoglobin level in experimental group than control. Increased Total Free sugars (TFS) and Total cholesterol (TC) level & decreased Total protein (TP) level were observed in experimental group. Decreased TFS and TP where increased TC level observed in liver and muscle tissues of experimental group than control. There is a need of complete eradication of using Phosphamidon pesticides in agricultural farms.

Keywords: Labeo rohita, Phosphamidon, blood, liver

1. Introduction
Phosphamidon, commonly known as demicron is one among the organophosphates insecticide which is used to control the various insect pests. Though pesticides are applied to enhance agricultural production while the indiscriminate and wide use of pesticides in the field ultimately pollute the aquatic environment (Mercy *et al*., 2000) [17] and affects the nontarget organisms mainly fishes either directly or indirectly (Rajalakshmi and Mohandas, 1998) [20]. In agriculture, wide and high usage of pesticides leads to creating awareness about their toxicity in the aquatic environment (Nemcsok and Benedeczky 1995) [18].
Ventura *et al*. (2008) [28] reported that pesticides presents in aquatic environments can affect aquatic organisms in different ways. In India, more than 70% of the chemical formulations are employed in agricultural practices and to find their way to freshwater bodies, ultimately affect non-target organisms (Bhatnagar *et al*., 1992) [6]. Fishes acts as the ideal sentinels and susceptible to any alteration in the physico-chemical characteristics of the habitat (Sadiq Bukhari *et al*., 2012) [24]. Blood indices are greatly used to evaluate the toxic stress of the fishes (Kavitha *et al*., 2010) [12] and diagnosis of fish physiology are used to ascertain sublethal and chronic exposure of contaminants (Kim *et al*., 2008) [13].
Biochemical, physiological parameters are the common biomarkers of exposed animals to pollutants (Bernet *et al*., 1991) [5]. Biochemical parameter acts as a diagnostic tool for monitoring the pathological status of fish (Baskaran 1991) [4], in terms of tissue damage causing decreased metabolic rate resulting in reduction of growth (Sivakami *et al*., 1994) [25]. The mutual action between a toxicant and a biological system can be calculated using hematological, biochemical biomarkers (Hoyle *et al*., 2007; Li *et al*., 2010) [11, 14]. Studies on the effects of organophosphate pesticide phosphamidon on different species of fishes have already been done by many scientists (Gopalakrishnan, 1990, Ganguly *et al*., 1997 and Govindan *et al*., 1994) [9, 8, 10]. Chronic effects of Phosphamidon pesticide on freshwater fish *Labeo rohita* for 15 days exposure were analyzed.

2. Materials and Methods
The fresh water fish *Labeo rohita* used in the present study is edible, commercially valuable and distributed all over India. The fishes were fed on boiled egg white ad libitum. The standard length and weight of the fish ranged between 9-9.5 cm and 20-23 g, respectively. Fishes were acclimatized to laboratory conditions for 15 days and separated into groups (12 each). Experimental group was exposed to 1ppm concentration of Phosphamidon and control group was also maintained separately.
After 15 days, blood was collected from fishes by cardinal vein puncture technique using an insulin syringe containing 0.1ml of 0.2% EDTA (Remya 2010) [21]. RBC and WBC were counted with a Neubauer haemocytometer with RBC and WBC diluting fluids (Rusia and

Sood, 1992) [23] respectively. Haemoglobin was estimated by Darbkin's method (Suganthi *et al.* 2015a) [26]. Liver and muscle tissues were dissected homogenized and extract. Total free sugars (Roe 1955) [22] and Total cholesterol (Zarrow *et al.* 1964) [29] were estimated in blood, liver and muscles. The protein content of the blood, liver and muscles was estimated using the method of Lowry *et al.* (1951) [15]. The results are statistically analyzed by using SPSS software (17.0 version).

3. Results and Discussion

The declined number of RBC in fish caused by toxicant exposure has been announced by Allin and Wilson (2000) [2] and Chowdhury *et al.* (2004) [7]. The decreased hemoglobin concentration represents that the fish power to supply adequate oxygen to the tissues is limited considerably and this will result in decline of physical activities (Nussey *et al.*, 1995) [19]. Reduced lymphocyte count observed is attributed to increased leukocytes mobilization to protect the body against infections (Ajani and Akpoilih 2010) [1].

Toxicants in the aquatic environment may cause influence at cellular or molecular level which results in significant changes in the biochemical parameters of the organisms (Kavitha *et al.*, 2010) [12]. Suganthi *et al.* (2015b) [27] reported reduced RBC, WBC and Hb levels decreased in pesticide treated *O. mossambicus* fishes. The most common hematology discoveries in toxicological investigation are reductions in RBC, WBC count and hemoglobin concentrations that are like our detecting in present research. Table 1 showed the Mean ±SD values haematological and biochemical parameters. Total RBC and WBC count & Hb values were decreased in experimental group than control group due to stress developed by the chemical exposure.

Table 1: Mean ±SD values of Haematological and Biochemical parameters of freshwater fish *Lobeo rohita* in control and experimental group (n=12).

Parameters	Control Group	Experimental Group (15 days)
Blood Tissue		
Total RBC count (x10^6 cells/cu.mm.)	6.38±0.29	5.22±0.31
Total WBC count (x10^3cells/cu.mm.)	3.69±0.19	2.55±0.13
Haemoglobin (gm/dL)	6.95±0.17	5.28±0.09
Total Free Sugars (mg/dL)	5.21±0.15	7.58±0.26
Total Cholesterol (mg/dL)	2.75±0.16	3.12±0.11
Total protein (gm/dL)	1.29±0.13	1.02±0.11
Liver Tissue		
Total Free Sugars (mg/dL)	9.58±0.21	5.62±0.82
Total Cholesterol (mg/dL)	3.29±0.16	5.07±0.21
Total protein (gm/dL)	2.12±0.37	0.95±0.19
Muscle Tissue		
Total Free Sugars (mg/dL)	8.18±0.23	5.99±0.19
Total Cholesterol (mg/dL)	4.20±0.11	2.91±0.12
Total protein (gm/dL)	2.95±0.18	1.02±0.09

Experimental groups showed hyperglycemic in blood where hypoglycemic condition in liver and muscle tissues (Figure 1) due to immediate energy source for cope up stress. Increased total cholesterol level observed in blood and liver tissues. Decreased protein level observed in experimental group tissues than control. One way ANOVA analysis for biochemical parameters showed significant results (P<0.01) between the control and experimental groups (F=15.68).

Biochemical composition (Carbohydrate, Cholesterol and Protein) of $CoCl_2$ pesticide treated fishes showed decreased level than control (Suganthi *et al.*, 2015b) [27] which is similar to our results. Balasubramanian *et al.* (1999) [3] reported increased Total cholesterol level in blood and liver tissues of *O. mossambicus* exposed to 20 days. The degradation of protein suggests the increase in proteolytic activity and possible utilization of their products for metabolic purposes and cause damage to tissues (Mastan and Rammayya, 2010) [16].

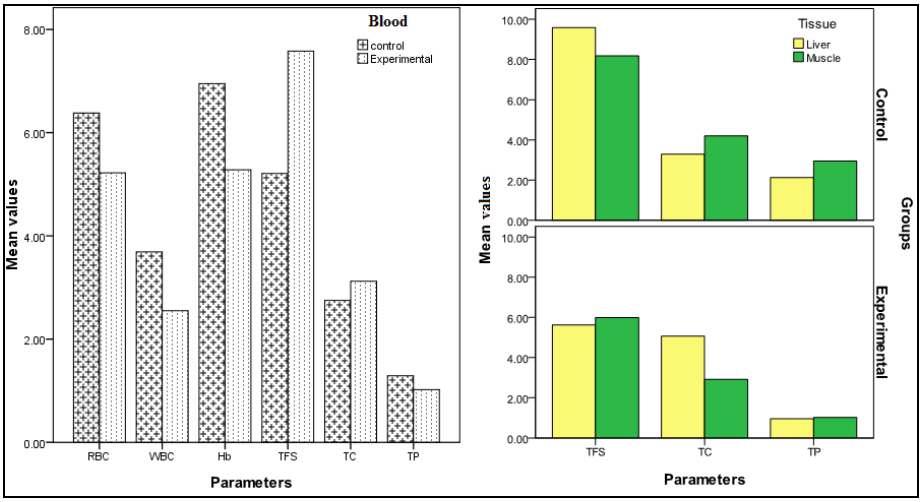

Fig 1: Bar diagram of haematological and biochemical studies in freshwater fish L. rohita exposed to phosphomidon

4. Conclusion

Our study reveals that the exposure of low concentration (1ppm) of Phosphamidon insecticide can severely alters the blood tissues and bimolecular composition (biochemical) of cells in Liver, Muscle of freshwater fish *Labeo rohita* which seriously affects the survivality of fish in its habitat. There is a need of complete eradication of using Phosphamidon pesticides in agricultural farms which eventually ends up in aquatic biota.

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6. References

1. Ajani EK, Akpoilih BU. Effect of Chronic Dietary Copper Exposure on Haematology and Histology of Common Carp (*Cyprinus carpio* L.). J Appl Sci Environ Manage. 2010; 14(4):39-45.
2. Allin CJ, Wilson RW. Effects of Pre-Acclimation to Aluminium on the Physiology and Swimming Behaviour of Juvenile Rainbow Trout (*Oncorhynchus mykiss*) during a Pulsed Exposure, Aquatic Toxicology. 2000; 51(2):213-224.
3. Balasubramanian P, Saravanan TS, Palaniappan MK. Biochemical and Histopathological Changes in Certain Tissues of *Oreochromis mossambicus* (Trewaves) Under Ambient Urea Stress. Bull. Environ. Contam. Toxicol. 1999; 63:117-124.
4. Baskaran P. Use of biochemical parameters on biomonitoring of pesticide pollution in some freshwater fishes. Ecotoxicol. Environ. Monit., 1991; 1(2):104-109.
5. Bernet D, Schmit H, Meier W, Basker HP, Wahli T. Histopathology in fish – proposal for a protocol to assess aquatic pollution. J. Fish Diseases 1999; 22:25-34
6. Bhatnagar MC, Bana AK, Tyagi M. Respiratory distress to *Clarias batrachus* (Linn.) exposed to endosulfan a histological approach. J Environ Biol. 1992; 13:227-231.
7. Chowdhury MJ, Pane EF, Wood CM. Physiological Effects of Dietary Cadmium Acclimation and Waterborne Cadmium Challenge in Rainbow Trout: Respiratory, Ionoregulatory, and Stress Parameters, Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology. 2004; 139:163-173.
8. Ganguly A, Medda C, Sarkar SK, Basu TK. Acute toxic effect of sublethal phosphamidon exposure on *Anabas testudineus* (Bloch). Indian J Fish. 1997; 44(2):211-215.
9. Gopalakrishnan KS. Studies on the toxic effect of some pesticides on the fish *Etroplus maculatus* (Bloch). Ph.D Thesis. Cochin University of Science and Technology. 1990.
10. Govindan VS, Jacob L, Devika R. Toxicity and metabolic changes in *Gambusia affinis* exposed to phosphamidon. J Ecotoxicol Environ Monito. 1994; 4(1):1-6.
11. Hoyle I, Shaw BJ, Handy RD. "Dietary Copper Exposure in the African Walking Catfish, *Clarias Gariepinus*: Transient Osmoregulatory Disturbances and Oxidative Stress," Aquatic Toxicology 2007; 83(1):62-72
12. Kavitha C, Malarvizhi A, Kumaran SS, Ramesh M. Toxicological Effects of Arsenate Exposure on Hematological, Biochemical and Liver Transaminases Activity in an Indian Major Carp, *Catla catla*, Food and Chemical Toxicology 2010; 48:2848-2854.
13. Kim SG, Park DK, Jang SW, Lee JS, Kim SS, Chung MH. Effects of Dietary Benzo Pyrene on Growth and Hematological Parameters in Juvenile Rockfish, *Sebastes schlegeli* (Hilgendorf), Bulletin of Environmental Contamination and Toxicology 2008; 81:470-474.
14. Li ZH, Velisek J, Zlabek V, Grabic R, Machova J, Kolarova J *et al.* Hepatic Antioxidant Status and Hematological Parameters in Rainbow Trout, *Oncorhynchus mykiss*, after Chronic Exposure to Carbamazepine, Chemico-Biological Interactions. 2010; 183: 98-104.
15. Lowry DH, Rosebrough NJ, Far AL, Randal RJ. Protein measurement with folin phenol reagent. Journal of Biological Chemistry. 1951, 193:265.
16. Mastan SA, Rammayya PJ. Biochemical profile of *Channa gachua* (Ham) exposed to sublethal doses of Dichlorovas (DDVP). The internet journal of Toxicology. 2010; 8:27-32.
17. Mercy TVA, Kurup BM, Nair JR, Sulekha BT. Lethal toxicity of phosphamidon on the juveniles of *Anahas testudineus* (Bloch) and *Etroplus maculates* (Bloch). Indian J Fish. 2000; 47(1):87-90.
18. Nemcsok J, Benedeczky I. Effect of sublethal concentrations of phenol on some enzyme activities and blood sugar level of carp (*Cyprinus carpio* L.) Environ Monit Assess. 1995; 14:377-383.
19. Nussey G, Van Vuren JHJ, Du Preez HH. 'Effects of Copper on Haematology and Osmoregulation of the Mozambique Tilapia, *Oreochromis mossambicus* (Cichlidae),' Comparative Biochemistry and Physiology. 1995; 111:369-380.
20. Rajalakshmi P, Mohandas A. 1998. Acute effecrs of pesticide stress on the rate of oxygen uptake in the fresh water mussel, Lamellidans corrianus (Lea.) Proc Acad Environ Biol 1998; 7(1): 45-49.
21. Remya V. Biochemical Effects of different Phenolic compounds on *O. mossambicus*. Ph.D. Thesis. Cochin University of Science and Technology, Cochin. 2010.
22. Roe JH. The determination of sugar in blood and spinal fluid with anthrone reagent. J Biol Chem. 1955; 212:335-443.
23. Rusia V, Sood, SK. Routine hematological tests. In: "Medical laboratory technology" Kanai L Mukerjee. (Ed.), Vol. I. Fifth reprint. Tata McGraw Hill Publishing Company Limited, New Delhi, 1992 pp.252-258.
24. Sadiq Bukhari A, Syed Mohamed HE, Broos KV, Stalin A, Singhal RK. Histological variations in liver of freshwater fish *Oreochromis mossambicus* exposed to 60Co gamma irradiation. Journal of Environmental Radioactivity. 2012; 113:57-62.
25. Sivakami R, Premkishore G, Chandran MR. Sublethal effects of chromium on feeding energetics and growth in freshwater cat fish *Mystus vittatus*. J. Freshwater Biol. 1994; 6(2):165-175.
26. Suganthi P, Murali M, Sadiq Bukhari A, Syed Mohamed HE, Basu H, Singhal RK. Haematological studies on freshwater Tilapia treated with ZnO nanoparticles. Journal of Advanced Applied Scientific Research. 2015a; 1(1):41-67.
27. Suganthi P, Soundarya N, Stalin A, Nedunchezhiyan S. Toxicological effect of cobalt chloride on freshwater fish *Oreochromis mossambicus.* International Journal of Applied Research. 2015b; 1(3):331-340.
28. Ventura BC, Angelis DF, Maria AM, Morales M. Mutagenic and genotoxic effects of the Atrazine herbicide in *Oreochromis niloticus* (Perciformes, Cichlidae) detected by the micronuclei test and the comet assay. Pestic. Biochem. Physiol. 2008; 90:42-51.
29. Zarrow M, Yochim JM, McCarthy JL. Experimental Endocrinology. A source book of Basic Techniques. Academic Press, N York, 1964, 519.