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Impact of triazophos infestion on heamatological parameters of cat fish *Channa punctatus* (Bloch).

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Abstract

The present investigation was carried out to study the impact of sublethal concentration of Triazophos exposed after 24hrs, 48hrs, 72hrs and 96hrs on the hematological parameter of cat fish *Channa punctatus*. *C. punctauts,* is an edible fish with average body weight of 82-120 grams, were subjected to hematological investigations. The hematological analysis showed significant reduction in red blood cells (RBCs) count, hemoglobin (Hb) value, Packed cell volume (PCV), mean corpuscular hemoglobin (MCH), mean Corpuscular hemoglobin Concentration (MCHC), and mean Corpuscular (MCV), while total white blood cells (WBCs) count, were significantly increased in the fish *Channa punctatus*.

Keywords: *Channa punctatus*, Hematological analysis, Hemoglobin value, PCV, RBCs Count, Triazophaos.

Introduction

Aquatic ecosystems that run through agricultural areas have high probability of being contaminated by runoff and ground water leaching by a variety of chemicals. Highly effective pesticides are used tremendously, which on entering the aquatic environment bring multiple changes in organism by altering the growth rare, nutritional value, behavioral pattern, etc. A major part of the world's food is being supplied from fish source, so it is essential to secure the health of fishes[1]. These pesticides are non-biodegradable and accumulate in the food chain. Mostly they are prone to affect the nervous system causing tumors in living organisms. In India as much as 70% of the chemical formulations employed in agricultural practices are believed to affect non-target organisms and to find their way to fresh water bodies, ultimately polluting them. It was reported that the blood parameters of diagnostic importance are erythrocyte and leucocytes counts, haemoglobin, haematocrit and leucocyte differential counts would readily respond to incidental factor such as physical stress and environment stress due to water contaminants. [2-3] Since early detection of specific physiological abnormalities provide an indication of exposure prior to manifestation of any gross damage, the measurement of biochemical changes in blood and tissue of fish under exposure to the toxicant may be used to predict the toxic effects of toxicants. Blood parameters are considered pathophysiological indicators of the whole body and therefore are important in diagnosing the structural and functional status of fish exposed to toxicants[4]. A number of hematological indices such as hemoglobin (Hb), Red blood cells (RBCs) and soon, are used to assess the functional status of the oxygen carrying capacity of the blood stream and have been used as indicator of metal pollution in the aquatic environment[5].

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Material and methods

Channa punctatus (Bloch.) is selected for the evaluation of toxicity of Triazophos for 24, 48, 72 & 96 hours. The toxicity is studied by observing the physiological and biochemical activities. It is a highly nutrient food and consumed daily by the large number people in Andhra Pradesh. *Channa punctatus*, commonly called snake - headed fish or Indian murrel, locally called in Telugu "kora menu" or "bomme". It is a fresh water fish with an extra lung-like respiratory organ. Hence, capable of living out of water for a longer time. *C. Punctatus*, is an edible fish with average weighing 82-120 grams, were procured from the Nirmal and Warangal markets. These fish were kept in cement tanks (6x3x3 feet) at least for 3 weeks for acclimatization under continuous water flow. The water temperature was 22+1.0^{o}c. These were fed adlibitum with ground nut cake along with the commercial pellets (1-1.5% body weight) prior to experiment. They were starved one day before starting the experiment[6]. Both the sexes were used for the experiment. The size of the fish is 25.5±1.21 cm in length and weight about 50±1.30 grams are used in the toxicity studies.

Blood Collection

The blood was collected by severing the cadual peduncle using a sharp knife for hematological studies. The red blood corpuscles (RBC) and White blood corpuscles (WBC) were counted by haemocytometer crystalline chamber using "Hayem's" and diluting fluid, respectively. The packed cell volume (PCV) it is also known as haematocrit values were measured[7]. For estimating hemoglobin (Hb), blood sample was treated with 0.1N Hydrochloric acid (Hcl) taken upto the 10.0 mark in the graduated tube and the colour of the acid haematin was matched with given standards using hemoglobinometer[8]. The mean carpuscular hemoglobin (MCH), Mean Corpuscular Hemoglobin concentration, (MCHC) and mean corpuscular volume (MCV) were calculated by following standard formulae.[9]

Results and Conclusion

The quantitative changes of hematological parameters like, RBC, WBC, Hb, PCV, MCH, MCHC, MCV and the pathological changes of the blood cells in the fish *C. punctatus* both in control and sublethal concentration of Triazophos exposed after 24hrs, 48hrs, 72hrs and 96hrs are given in Table – 1. The hematological analysis revealed a highly significant reduction in Red Blood Cell (RBCs) count from 8.20±0.08 (X 10^{6} millions / cu.mm) in the non-infested cat fish *Channa punctatus* to 7.64±0.25*, 6.20±0.12, 5.9±0.15 and 5.6±0.28 (X 10^{6} mm/cu.mm) in the infested during 24hrs, 48hrs, 72hrs and 96hrs respectively with triazophos. Also a significant decreased was recorded in hemoglobin (Hb) from 18.50 grams / 100 ml of blood in the non-infected catfish in comparison with 14.93±1.80, 12.55±0.85, 11.00±0.40 and 9.10±0.3 in the infected fish. Haematocrit or PCV is essential in clinical hematology to determine alterations in blood. The PCV value in nin-infested fish is 28±2.58 percentage. The levels of PCV gradually decreased from 24hrs, 48hrs, 72hrs and 96hrs of exposure period in triazophos treated fish. The reduction of RBC is mainly due to development of hypoxic condition during the treatment which inturn leads to increase in destruction of RBC or decrease in rate of formation of RBC due to non availability of Hb content in cellular medium[10]. The damaging of toxicant on erythrocyte may be secondary, as resulting from a primary action of toxicant on erythropoietic tissues on which there exist a failure in red cell production and or due to increase in the of erythrocyte destruction[11- 12]. From the recent studies, it is revealed that the RBC count and Hb concentration decrease may depend upon age of animal, stress condition, sex and availabity of food in a particular medium[13-16]. The PCV readings are valuable in determining the effect stressors on the health of fish and are also used to determine the oxygen carrying capacity of blood[17]. Total WBCs count was significantly increased from 3000±129.09 cu.mm in non-infested catfish to 3600±81.25, 4200±129.09, 4870±65.41 and 5100±129.09 cu.mm in the infested during 24hrs, 48hrs, 72hrs and 96hrs respectively with triazophos. That increase in WBCs count occurred as a pathological response since these WBCs play a great role during infestation by stimulating the haemopoietic tissues and the immune system by producing antibodies and chemical substances working as defense against infection[18-20] .The WBC showed greatest sensitivity to changes in the environment of leucocytes was lymphocytes[21]. Leucocytosis is evidenced in present study, by the increase in total leucocyte count during triazophos intoxication. Similar increase in WBC counts was found in fish *H. fossilis* during nickel intoxication[22]. *C. panctatus*

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with lead *C. batrachus* under mercuric chloride[23-24]. WBC is important cells in the immune system, because of their main defensive function. The WBC will respond to immediately along with the change in medium due to xenobiotic transformation. During toxic exposure period of Triazophos the WBC counts enhanced. It indicates the fish can develop a defensive mechanism to overcome the toxic stress. The MCV was significantly decreased from 34.14±1.05 fimtoliter (Ft) in non-infested catfish to 32.06±4.29*, 35.48±1.54*, 33.05±5.07* and 28.57±1.94* fimtoliter (Ft) in the infested during 24hrs to 96hrs with triazophos. MCHC was significantly decreased from 66.07±1.72 gr% in non-infested catfish to 60.93±1.10*, 57.04±5.61*, 56.41±1.26* and 56.87±2.61* gr% in the infested during 24hrs to 96hrs with triazophos. The MCV, MCH, MCHC, Values are completely depend upon the factors of PCV, RBC count and hemoglobin concentration. In the present study, the PCV, RBC and hemoglobin concentration is completely altered. So indirectly the values of MCV, MCH and MCHC were effected, and significantly decreased. The decrease in hematological indices due to macrocytic hypochromia, iron deficiency and increased haemolysis[25-26]. Similarly altered MCV, MCH and MCHC values were observed[27] in *Channa punctatus* under cypermethrin toxicity. It was reported that all hematological indices significantly altered in *Cyprinus carpio* during Cadmium toxicity[28]. Similar findings were observed by a number of research works in different fish. [29-30]

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