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QUINALPHOS INDUCED BIOCHEMICAL CHANGES IN THE FRESH WATER FISH *OREOCHROMIS MOSSAMBICUS*

Zoology

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ABSTRACT

Main focus of this study was on how an organophosphate (quinalphos) pesticide affects a vertebrate organism. For analyzing this some biochemical aspects were studied using standard methods. Data obtained in the present study clearly show that the pesticide quinalphos created functional alterations in the fish Oreochromis mossambicus. All the changes recorded were time dependent. Longer the duration of exposure heavier was the damage caused.

KEYWORDS

Oreochromis, quinalphos, blood glucose, muscle protein

INTRODUCTION

The problems caused by agro chemicals are of huge concern these days. Incidents of cancers are increasing rapidly and we need to figure out the environmental toxins that surrounds us. Studies like this can contribute to our knowledge of how the chemicals we are exposed to everyday can cause threat to the ecological balance and survival of species. It is important perform toxicology studies because it enables us to elucidate the poisonous properties of chemicals, increase the knowledge about the toxic properties of chemicals through scientific research, and advise the society on measures to control or prevent harmful effects of chemicals. In this study the main focus is on how an organophosphate pesticide quinalphos affects a vertebrate organism. For analyzing this some biochemical aspects were studied using standard methods. In order to achieve a mechanistic understanding of toxic action in ecotoxicology, bio-transformation enzymes of non-mammalian species, including fish, have been studied quite extensively (Rani, 2015).

MATERIALS AND METHODS

The present study was designed with the aim to understand the harmful effects of an organophosphorus pesticide (Quinalphos) using fish as a model organism. Changes in muscle protein and blood glucose were studied. Bioassays were conducted to determine the LC_{50} value and safe levels of the pesticide.

The fishes were starved one day prior to the bioassay tests. A group of 6 well acclimated fishes were introduced in the troughs containing 4 L of test medium. A wide-range toxicity study was conducted for short-term, i.e., 48 hrs. Organisms were exposed to a wide range of concentrations of quinalphos ranging from 1ppm to 3 ppm. Mortality was observed for every 12 hours in each trough and recorded. A narrow range toxicity study was conducted by preparing test concentrations of quinalphos as 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8, and 2ppm. Fish mortality were observed and LC_{50} was calculated using Probit analysis (Finney, 1971). $1/10^{th}$ of LC_{50} is taken as the test concentration and acclimatized fishes were kept in glass troughs and exposed to test concentration of the pesticide. A separate control population was also maintained. Fishes were sacrificed (4 each) from both test and control on alternative days until 12^{th} day. Blood and tissue were collected instantly for biochemical analysis.

Estimation of glucose - Amount of glucose in blood was determined by O-toludin method.

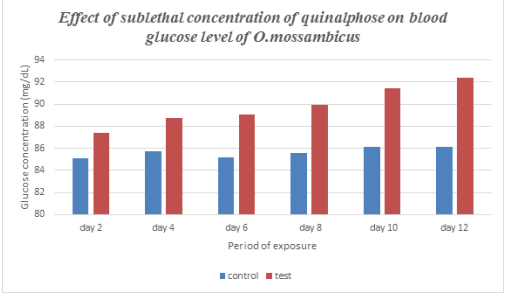
Estimation of protein - Amount of protein in muscle tissues was determined by Biuret method.

RESULTS AND OBSERVATIONS

In the present study the 48 hour LC_{50} value for the pesticide quinalphos to the fish *Oreochromis mossambicus* was estimated as 1.04 ppm.

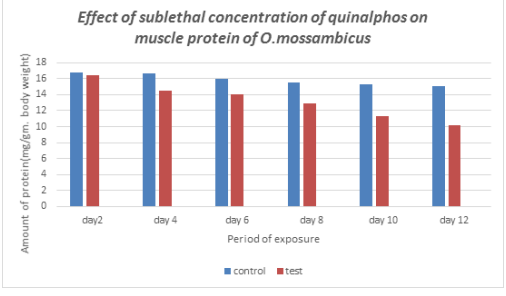
Blood glucose

Blood glucose level is found to be increasing steadily indicating hyperglycemia. The glucose level increased in pesticide treated fishes in comparison with control fishes in all exposure periods. On second day of exposure test fishes showed a 2.7% increase in blood glucose when compared to corresponding control group. After 4 days of exposure the percentage change was +3.5%. In all exposure periods glucose level was high in test when compared to the corresponding control group. The percentage increase was 4.5%, 5.1%, 6.23%, and 7.2% respectively for 6, 8, 10 and 12 days of exposure. As glucose is the immediate source of energy the organism might have tried to cope up with the stress caused by the pesticide by releasing the stored glycogen reserves to the blood as glucose as indicated by the increased values of blood glucose levels.



Muscle protein

Protein analysis shows that protein content declines in fishes exposed to pesticide more rapidly than in control group. After two days of exposure protein content in control fish was 16.72 mg/g body weight and in test the value was 16.44. In 4^{th} day of exposure the value of control was 16.64 and the value of test showed a decline of 12.7%. The trend continues in further groups also with 12.57%, 16.9%, 26.34%, and 32.4% decline in 6^{th}, 8^{th}, 10^{th} and 12^{th} day of exposure respectively.



DISCUSSION

Blood glucose level was found to increase steadily indicating hyperglycemia. The glucose level increased in pesticide treated fishes than in control fishes in all exposure periods. The percentage of increase was also increasing as days proceeded. As glucose is the immediate source of energy the organism might have tried to cope up with the stress caused by the pesticide by releasing the stored glycogen reserves to the blood as glucose as indicated by the increased values of blood glucose levels. Changes in blood glucose have been suggested as useful general indicator of environmental stress in fish (Nemcsok and Boross, 1982).

Muscle protein showed declining trend as compared to their corresponding control groups. This may be due to increased metabolism to overcome stress. It also appears that vigorous struggling may have enhance muscle activity which may probably contribute to protein degradation that is proteolysis. In fish, proteins are the primary energy source and are involved in regulating physiological and metabolic processes in the body and play a vital role as energy precursors in fishes exposed to stress conditions (Chitra *et al*., 2013).

REFERENCES

1. Chitra K C, Nikhila P, Asifa K P (2013) Short-term exposure to quinalphose induced biochemical and hematological changes in fresh water fish Oreochromis mossambicus. J.Adv.Lab.Res.Biol.3 (1).
2. Finney, D.J. (1971). Probit analysis, 3rd (Ed.), Cambridge University Press, London, 333 pp.
3. Nemcsok, J., Boross, L. (1982). Comparative studies on the sensitivity of different fish species to metal pollution. Acta. Biol. Acad. Sci, Hung. 33, 23-27.
4. Rani A P A (2015) Genotoxicity studies of endosulfan in Oreochromis mossambicus Asian Academic Research Journal of Multidisciplinary 1 (8), 57-63.