Abstract

Now a day’s bioinformatics and computer applications in life sciences research highly required and easy way to calculate, design the way of experimental protocol and for databases as well as various library and research institute through internet connect in a single click. By the use of different software easily all parameters of fish can be calculated in accurate way than the manual calculations. In given biochemical study of fish Channa punctatus had used various methods and instruments which all are based on computer like spectrophotometer, colorimeter, flame photometer and other digital instruments which all are connected with the computer, LC50 also calculated by the help of software, all type of graphs and tables design by computer application. Present study related on the fresh water snake headed fish Channa punctatus after intoxication pesticide organophosphate Nuvan. Water is one of the most important essential basic natural resources to the living kingdom. In India, there have been tremendous places in the development and standardization of industrial and agriculture practice, since independence. All pesticides, industrial and agricultural sources discharge their effluents in the adjoining watery areas, they not only frequently make “Man caused” serious hazards in the quality of water, but also the aquatic life, especially to the fish, which is also a Chief food resources of the country. Different kinds of pesticides that are used to control pests like organochlorine, organophosphate (OP) etc. Lethal concentration of Organophosphate (OP) Nuvan calculated for the fresh water snake headed fish Channa punctatus 0.27ml/L after 24,48,72 and 96 hours. For the chronic study 1/10th Nuvan concentration (0.027ml/L) provided to observing fish to period 7,14,21 and 28 days. Serum Urea, observed significant increase level in Channa punctatus under Nuvan toxicity at the level (p < 0.001). Serum Creatinine (Cre) also estimated significant and non significant elevation in Channa punctatus under Nuvan stress at the level of (p > 0.05 and p < 0.001). Serum Blood Urea Nitrogen (BUN) observed significant elevation in Channa punctatus under Nuvan toxic stress at the level (p > 0.001), for these all data’s calculations has been made by the use of computer applications. It’s equally less time consuming as well also highly impactful for accuracy determination and for references.

Keywords

Fishery Research, Bioinformatics, Computer Applications, Biochemical

I. Introduction

Water is the precious gift of nature to mankind. Water is essential for existence of biotic world including man and his activities. It is an element in determining the quality of environment and the overall social and economic development possibilities of any region. Next to air, the most abundant compound in the living material which makes up more than 80% of cytoplasm is water. In the national context it is the life blood of a nation. It is such an important commodity that not only we need water to grow our food, generates our power and run our industries but we need a freshwater to our daily lives because of our bodies need to ingest water every day to allow the metabolic activities to function. At the national level the total use of water at present is about 2 million cubic metres per year from which 18% for domestic uses, 69% for agriculture and 13% for industry. Contaminated water only is a threat for aquatic organisms including fish but is also responsible for transmitting a wide variety of disease in humans. WHO survey stating that about 80% of ill health in developing countries by polluted water and sanitation relation. Overall about 30,000 people die from water related diseases each day. At a time about 400 million people are suffering from gastroenteritis, 200 million with schistosomiasis, 160 million with malaria and 30 million with onchocerciasis worldwide.

Aquatic toxicologists use physiological dysfunction in fishes to assess the quality of water this assessment to be meaningful requires knowledge of the physiological aspects of fishes living in polluted water received focused interest during the few last decades. In India out of total pesticides consumption of 75,000 MT in which 70% insecticides, 12% herbicides, 8% fungicides and 10% fumigants. India with 173 million hectares of aerable land uses about 80% of pesticides in the form of insecticides therefore the use of pesticide has increased considerably over the last 20 years at rate of 12% per year. Insecticides may occur naturally in the plants or can be synthesized artificially, synthetic insecticides like DDT, DDD, Aldrin, BHC, Malathion, DDVP, TEPP, Pyradon, Isodon and Resin. A no. of pesticide viz. organ chloride, carbamate, pyrethroid, organophosphate group has been reported to play a vital role to increase the agricultural productivity by controlling pests in the agricultural field. Highly effective organophosphates are used tremendously which on entering the aquatic environment being multiple changes in organisms specially fish by altering the growth rate, nutritional value, behavioral pattern by disturb their biochemistry, hematology and physiology. Fishes are the important part of aquatic biota. Fish live in very intimate contact with their environment through thin gills, which comprises over half the body surface area. Then if any kind of change in ecosystem or environment, Fishes are sensitive indicator in which any residual amount of Nuvan present is too small to be reliable analyzed chemically. Fishes are nontarget species for pesticides and widely used in the form of good nutrients all over the world. That is why toxicity tests necessary in water pollution evaluation because chemical and physical measurements alone are not sufficient to assess potential effects on aquatic biota. Fish Channa punctatus, a fresh water fish and highly used in the form of valuable food in all over India. If the toxicant disrupt fish blood biochemistry blood serum parameters choosed to present finding to find out effect of toxicant on whole body of experimental animal fish like renal profile Urea, BUN and Creatinine to toxicant effect on kidney and muscles. They indicate water quality, fish health and indirectly also human health and through this ecosystem showing effect on whole environment which could add a mile stone in the existing knowledge.

II. Materials and Methods

A. Experimental Animal

Fishes were rearing in the animal house, Department of Zoology, School of Life Sciences, Khandari Campus, Dr. Bhim Rao Ambedkar University, Agra. Which were taken from Malpura
LC50 Determination

Sixty fishes randomly selected 10 – 12 weeks mature and length and weight 12 – 14 cm, 50 to 70 gms respectively were taken during experiment.

Maintenance and caring of Experimental animal

Fresh water fishes Channa punctatus kept in glass aquaria measuring 75 cms x 37.5 cms x 37.5 cms. with 25 litre tap water. Room temperature 27°C ±5°C, water temperature 12 – 15°C, pH 7.2. Water stored before one week to start the practical, glass aquaria washed with KMnO4 and kept the fishes time to time 15 minutes with 2 or 4 pallet of KMnO4 water to avoid any kind of dermal infection.

Commercial marketed food or egg yolk was supplied to fishes during acclimatization period, food supplied two time in a day 10.30 am. to 4.30 pm. feeding stopped prior to 24 hours of the experiment. Fishes 2 weeks acclimatized in the same way to start the practical.

B. Experimental Chemical

Organophosphate chemical “Nuvan” (76% EC) also called DDVP, Nogos, Dhoom, vapona, purchased from local Agrochemical shop, chhippitable, Agra which manufactured by Syngenta India Ltd. 14 J Tata Road, Mumbai, 400020.

C. Experimental Design

Experiment Simply divided in two parts :-

1. LC50 Determination
2. Experimental practical

1. LC50 Determination

Thirty fishes choose randomly to LC50 determination by the log dose/regression line (Finney, 1971). Five aquaria were setup. In each aquaria six fishes were taken. Four aquaria setup with treated Nuvan and one with control set for 24, 48, 72 and 96 hrs. LC50 value was calculated 0.27 ml/l, which was earlier noticed (Table 1).

2. Experiment Practical

For observing blood serum biochemistry of fish Channa punctatus, thirty fishes again acclimatized after 15 days of the first experiment. Five aquaria were set up four aquaria maintained with treated sublethal value of Nuvan 1/10 (0.027 ml/l) with one control set. Food was stopped before 24 hrs of the experiment time 7, 14, 21 and 28 days.

Fish were sacrificed simply by a little struck on head from the holding tail side of fish with the help of hand. Then autopsy was done given different time intervals (7, 14, 21 and 28 days).

(i). Serum Separation

Blood directly taken from the heart after live dissection of experimental fish with the help of scissor, forceps and syringe. Blood was taken in a sterilized vials, blood sample was allowed to stand 30 minutes than centrifuged 3000 rpm for 15 minutes, supernatant part of sample was taken and stored frozen (-4°C) and used for biochemical estimation.

(ii). Serum Biochemical assay

A serum electrolyte profile like –). Urea, Creatinine, Blood Urea Nitrogen (BUN) and fish behavior were observed by kit reagent followed by kit methods in Channa punctatus. All kits purchased from span diagnostic Mumbai.

(iii). Statistical Calculations

All data were statistically calculated by Fischer and Yates (1950) statistical formula. Results were expressed as mean, ± S.Em., t test value for six animals in each aquaria.

IV. Result and Discussion

Toxic effects of Nuvan with different time intervals 7, 14, 21 and after 28 days on serum renal profile (Urea, Creatinine, Blood Urea Nitrogen, Fish Behaviour) on fresh water snake headed fish Channa punctatus. Serum urea, creatinine and blood urea nitrogen observed non significant and significant elevation in Channa punctatus at the level (p > 0.05, p < 0.001) after intoxication of Nuvan.

An increase in serum urea level after Nuvan sublethal dose in Channa punctatus after 7, 14, 21 and 28 days (Fig. 1). Higher level of urea might be due to kidney impairment and possible enhancing protein catabolism together with accelerated amino acid deamination for gluconeogenesis is properly acceptable postulate to interpret the rise level of urea in blood serum of Channa punctatus under Nuvan stress(Adamu and Siakpere, 2008).

Fish showed loss of body balance, restlessness, rapid body movement, convulsions, difficulty in respiration, body colour and toxicant. So the Nuvan is highly toxic to fish, also change water quality, It may fatal to environment and create harmful effect to aquatic animals as well as water and other living being.

References


Table 1: Toxicity Evaluation of Nuvan to Channa Punctatus Specifying Fiducial Limits

<table>
<thead>
<tr>
<th>Experimental Animal</th>
<th>Compound</th>
<th>Regression equation</th>
<th>LC50</th>
<th>Variance</th>
<th>Fiducially limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channa punctatus</td>
<td>Nuvan (DDVP)</td>
<td>$Y = 5.01 + 2.22 (X_m - 2.46)$</td>
<td>0.27 ml/L</td>
<td>0.042</td>
<td>m1 (+) = 2.53 m2 (-) = 2.41</td>
</tr>
</tbody>
</table>

Effect of Nuvan toxicity on serum Urea in Channa punctatus (Bloch.)

Fig. 1: Effect of Nuvan Toxicity on Serum Urea in Channa Punctatus (Bloch.)
Fig. 2: Effect of Nuvan Toxicity on Serum Creatinine in Channa Punctatus (Bloch.)

Fig. 3: Effect of Nuvan Toxicity on Serum Blood Urea Nitrogen (BUN) in Channa Punctatus (Bloch.)