The Study of Phenol Toxicity in the Indian Major Carp Cirrhinus mrigala (Hamilton)

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Abstract

The freshwater fish Cirrhinus mrigala was uncovered to , phenol toxicity (50% SP) for 24, 48, 72 and 96h. The LC 50 values were located to be 58.31mg-1 in static approach. The static LC50 values are higher than the continuous float-through method45.83,34.27, 22.32.Mg-1 The LC50 values confirmed a reducing trend with an boom in time of exposure in each the methods. The lower changed into greater in a non-stop waft-through method than within the static approach. The fish had been uncovered to , phenol toxicity concentrations of the pesticide for 24 and 96 hours to look at the changes in phenol. Total protein and nucleic acids (DNA, RNA) content in Cirrhinus mrigala and the adjustments are more reported in deadly publicity than in , phenol toxicity.

Keywords: Cirrhinus, mrigala, LC50, phenol toxicity, Genotoxic effect

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INTRODUCTION

Acute toxicity take a look at are carried out to assess the lethal awareness of the toxicant on aquatic organism within a brief period(96 Hrs). LC50 price is a statistical estimate of the toxicant's attention in water that kills 50% of the check animals under experimental situation at particular time durations (Spraque,1973). This price is preferably predicted for toxicity research as it gives a more ideal and reproducible concentration required to have an effect on 50% of the organism than another cost (Pickering and Henderson, 1966). Among toxicologists, the toxicity application at LC50 has won acceptance and has been taken into consideration as most especially rated test for assessing potential damaging outcomes of chemical contaminants to aquatic existence (Ankur et.al.,2014). Phenol is an fragrant chemical. Aquatic environments are inclined in the direction of phenol contamination from commercial effluents, agricultural and home wastes. Phenol derivatives also are fashioned at some point of the decomposition of natural depend (Michalowicz and Duda, 2007). Phenol and its allied components are particularly stable and may purpose problems to fitness (Weber,1991). Phenol has been defined as the toxic compound by way of the Environmental Protection Agency-United states and because of its relevance as an ecotoxin it has been maintained in the precedence list (Crittenden.Et.al.,2012). Toxic consequences of phenol of fishes had been carried out via several authors evaluated the haematological results of phenol. Histopathological influences had been elucidated by means of Monfared and Salati,(2013). Genotoxic impact become investigated by means of Jagetia and Aruna(1997). Tsutsui (1997) analyzed the carcinogenic impact of phenol. To perform the bioassay experiments to evaluate the toxic effect of phenol in Cirrhinus mrigala (Hamilton-1822) the intense toxicity test become achieved.

MATERIALS AND METHODS

Fish Acclimatization

The fingerlings of the freshwater fish Cirrhinus mrigala the weight (50±5g) and duration (15 ± zero.Five cm) was decided on for the experiment and have been accumulated from R.K Fish Farm, Orathanadu. Fish were screened for their pathogenic infections. Glass aquaria have been washed with 1% KMnO4 option to save you from fungal infection after which sun dried. Then healthy fish were then transferred into the glass aquaria (40x20x20) containing de-chlorinated faucet water (Temperature 28 ± 20C; general hardness 525 ± 31 mg/l; salinity 1.12 ± 0.18 ppt and pH 7.6 ± zero.05). Fish had been acclimated to the laboratory conditions for 10 to 15 days before experimentation. They had been fed frequently with commercial meals advert libitum and the medium (faucet water) changed into changed day by day to get rid of faeces and meals remnants.

Experimental Design

Acute toxicity test

Toxicity assessments were performed in accordance to the same old techniques (APHA, 1992). Stock solution of phenol with a attention of 10g in step with liter (equivalent to 10 ppt) turned into organized in distilled water and the extraordinary dilutions have been prepared by including the desired quantity of distilled water. Based at the modern bisection of intervals on a logarithmic scale, log concentrations had been fixed after carrying out the range locating test. The fish have been starved for 24 hours previous to their usage inside the experiments as endorsed via storage to avoid any interference within the toxicity of phenol. After the addition of the toxicant into the check tank with 10 liters of water having twenty fish, mortality of the fish became recorded after 24, forty eight, seventy two and ninety six hours. Simultaneously five replicates had been maintained. Per cent mortality turned into calculated and the values had been geared up into probit scale. Probit evaluation became done as suggested through Finney's (1971). The lethal toxicity experiments had been repeated anywhere wished. Regression strains of probit towards logarithmic adjustments of concentrations were made. Confidential limits (Upper and decrease) of the regression line with chi-square test were calculated through a automated programme for Finney's (1971) probity evaluation.

Chronic toxicity test

Based on the acute toxicity test (96h LC50) sub lethal concentrations (10% and 30%) of phenol were prepared and have been used as the experimental attention of the phenol inside the next experiments. Ten fishes have been exposed to each concentration for a length of 7, 21 and 28days. Simultaneously a manipulate batch become maintained.

RESULTS

Phenol triggered one hundred% mortality of fish Labeo rohita at forty eight.32 ppm and 50% mortality (ninety six hours) at 22.32 ppm. The LC50 values of phenol for 7, 21 and 28 days have been 50, forty and 30 ppm respectively.

(Table 1. Percent mortality of C. mrigala exposed to different concentrations of Phenol for different periods (mg/l)

Hoursof Exposure	LC50	L.C.L	U.C.L	Regression Equation	Calculated χ 2 value	Table χ 2 value
24	58.31	20.67	75.15	Y= 1.2159 + 2.4816 X	43.449	9.48
48	45.83	19.18	63.22	Y= 1.8589 + 3.3625 X	43.536	9.48
72	34.27	16.24	52.77	Y= 1.7489 + 2.5471 X	57.630	9.45
96	22.32	12.76	43.54	Y= 2.6371 + 2.3926 X	37.511	9.45

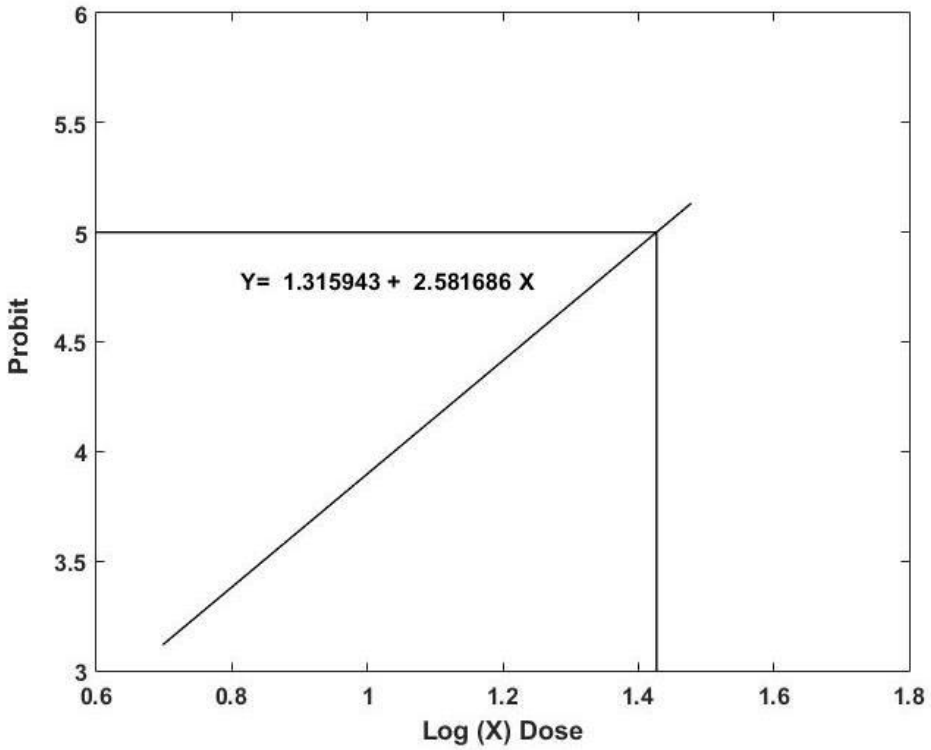

Fig. 1 The graph showing linear curve between probit mortality of fish against log concentration in *C. mrigala* on exposure to phenol – 24 Hrs

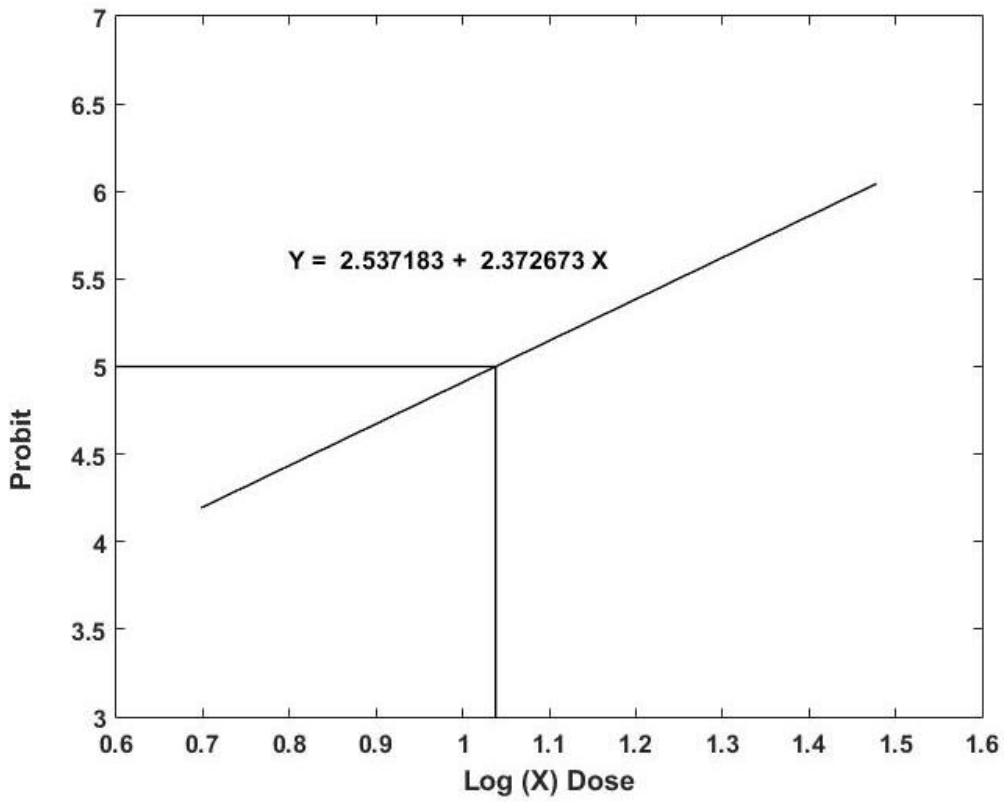

Fig. 2. The graph showing linear curve between probit mortality of fish against log concentration in *C. mrigala* on exposure to phenol –96 Hrs

DISCUSSION

LC50 fee of phenol inside the Indian predominant carp C.mrigla turned into observed to be 22.32mg/l and it has been taken into consideration as reasonably toxic. Phenol LC50 cost of C.mrigala become found to be slightly lesser than that of .Mossambicus. The LC50 price of the test fish is by means of some distance lesser than that of Lebistes reticulates and Sccobranchus fossilis (47.50 mg/l and 39.40mg/l respectively). Variations in LC50 fee amongst exclusive fishes can be attributed towards species individuality as well as the variations in the life level of the fish, their body size and also rely upon the absorption rate of toxicant and at the mechanism of detoxification.

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