Editorial

Acute Toxicity Test as a Method to Assessment Toxicity of Pollutants

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INTRODUCTION

Coastal areas are usually rich in natural resources that many opportunities such as agriculture, fisheries, industry and tourism provides to human communities living in these areas [1]. Human activities can have Devastating effects on aquatic life in coastal areas [2]. Marine ecosystems are threatened in different ways [3]; In fact, aquatic environments (i.e. coastal area and oceans) are final destination of several pollutants [4]. Rivers, effluents of industry and coastal cities and agricultural pesticides are major routes of contamination of marine ecosystems [5].

There are several methods to assess the toxicity of several substances and their effects on different types of aquatic organisms; such as behavioral and histopathological research [6,7]. Acute toxicity test (LC_{50} 96h) is one of method to assessment toxicity of several substances [8]. This test is base of all Ecotoxicological studies [9]; because; find the toxicity of various pollutants and sensitivity of different organisms is the first step in evaluating the effects of these substances [4].

ACUTE TOXICITY TEST

Acute toxicity test is a laboratory method to demonstrate sensitive of several organisms (i.e. fishes, Invertebrates and plant) exposed to different concentrations of environmental pollutants or chemical compounds [10]. The purpose of these tests finding the lethal concentration of 50% of sample population after exposure of substances for 96 hours (LC_{50} 96h); this concentration represents the toxicity of environmental pollutants to aquatic organisms [11]. Toxicity of different substances depended to environmental condition, size, age, species of organisms and gender [4]; however, result of acute toxicity test can be useful to Sustainable management of environments and future ecotoxicity studies.

INSTRUCTIONS OF ACUTE TOXICITY TEST

Preparation samples are first step of acute toxicity test. Test sample should be normal and have not unusual feature (i.e. mobility problems and disease) [10]. Before began the test samples (such as fish and vertebrate) should adapted to laboratory conditions; this period depended to laboratory facility varies between 2 to 3 weeks [12]. Water physicochemical conditions in the adaptation period must be controlled and maintained in the optimal range. Depending on the selected organisms must be used fit and healthy food [13].

It is suggested that the process of selecting samples from the main population after adaptation periods is randomly [14]. Transferring samples to the testing environment (test tanks) is 24 to32 hours before start the acute toxicity test and samples not fed during this period and time-test [8-10]; also, water physicochemical condition should be similar to adaptation period [7]. After transferring, samples divided to control and treatment group and exposure different concentration of pollutant such as heavy metals, agricultural pesticides and chemical compounds for 96 hours [5,10]. After exposure, the number of deaths of samples in each groups calculate after 24, 48, 72 and 96 hours and deaths samples remove in test tanks [12]. The number of groups or treatment depended on ethical considerations and laboratory facility [10]. Importantly, the aim of acute toxicity test to find the concentration of pollutants that lead to the deaths of more than half of tested samples at the end of 96 hours; therefore, repeat the test to detect the concentration that kills all members of the sample, is unnecessary [5,14]. Finally water physicochemical condition during acute toxicity test except pollutant concentration, should be similar with adaptation period [8,9].

The nominal concentration of Pollutants estimate result in 50% deaths of samples can be obtained within 24, 48, 72 and 96 h (LC_{50} 96h) by probit analysis in confidence limit of 95% by using SPSS software (IBM SPSS Statistics software) [5,15].

CONCLUSION

The acute toxicity is a laboratory method to demonstrate toxicity of pollutants to organisms. Although the result obtained from this method is somewhat unique laboratory conditions, but provides an overview of the average toxicity of different compounds. These data can be useful to future Ecotoxicological

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studies such as histopathological and behavioral research; because, without knowing the approximate toxicity of chemical compounds, study of their possible effects, can be very difficult and time consuming.

REFERENCES

1. Abdrabo MA. Socioeconomic conditions in coastal areas. A comparative analysis. In: Scapini F (ed) The Mediterranean coastal areas from water shed to the sea: interactions and changes. Firenze University Press, Firenze. 2006; 73-82.

2. Vikas M, Dwarakish GS. Coastal pollution: a review. Aquatic Procedia. 2015; 4: 381-388.

3. Derraik J. The pollution of marine environment by plastic debris: a review. Mar Poll Bull. 2002; 44: 842-852.

4. Yalsuyi AM, Vajargah MF. Recent advance on aspect of fisheries: a review. J coast Life med. 2017; 5: 141-148.

5. Hedayati A, Vajargah MF, Yalsuyi AM, Abarghoei S, Hajiahmadyan M. Acute toxicity test of pesticide abamectin on Common carp (*Cyprinus carpio*). J coast Life Med. 2014; 2: 841-844.

6. Melvin SD, Wilson SP. The utility of behavioral studies for aquatic toxicology testing: A meta-analysis. Chemosphere. 2013; 93: 2217-2223.

7. Abarghoei S, Hedayati A, Ghorbani R, Miandareh HK, Bagheri T. Histopathological effects of waterborne silver nanoparticles and silver salt on the gills and liver of goldfish *Carassius auratus*. Inter J Environ Sci Tech. 2016; 13: 1753-1760.

8. Vajargah MF, Hedayati A, Yalsuyi AM, Abarghoei S, Gerami MH, Farsani HG. Acute toxicity of Butachlor to Caspian Kutum (*Rutilus frisii Kutum* Kamensky, 1991). Enviro Treat Tech. 2014; 2: 155-157.

9. Yalsuyi AM, Vajargah MF. Acute toxicity of silver nanoparticles in roach (*Rutilus rutilus*) and goldfish (*Carassius auratus*). Environ Treat Tech. 2017; 5: 1-4.

10. EPA 2002. Method for measuring the acute toxicity of effluents receiving water to freshwater and marine organisms 5th ed. U.S. Environmental Protection Agency Office of Water, Washington DC. 275.

11. Vajargah MF, Hedayati A. Acute toxicity of trichlorofon on four viviparous fish: *Poecilia latipinna*, *Poecilia reticulata*, *Gambusia holbrooki* and *Xiphophorus helleri* (*Cyprinodontiformes*: Poecilidae). J Coast Life Med. 2014; 2: 511-514.

12. Chorehi MM, Ghaffari H, Hossaini SA, Niazie EHN, Vajargah MF, Hedayati A. Acute toxicity of Diazinon to the Caspian vimba, *Vimba vimbapersa* (*Cypriniformes*: Cyprinidae). Inter J Aquat Biol. 2013; 1: 254-257.

13. Vajargah MF, Hossaini SA, Niazie EHN, Hedayati A. Acute toxicity of two pesticides Diazinon and Deltamethrin on Tench (*Tinca tinca*) larvae and fingerling. Inter J Aquat Biol. 2013; 1: 138-142.

14. Braunbeck T, Lammer E. Fish embryo toxicity assays. German federal environment agency, Dessau. UBA Contract Number. 203 85 422. 2006.

15. Vajargah MF, Hedayati A. Toxicity Effects of Cadmium in Grass Carp (*Ctenopharyngodon idella*) and Big Head Carp (*Hypophthalmichthys nobilis*). TransylvRev SystEcol Res. 2017; 19: 43-48.