Vol 1 Issue 9 March 2012 ISSN No :2231-5063

International Multidisciplinary Research Journal

Golden Research Thoughts

Welcome to GRT

RNI MAHMUL/2011/38595 **ISSN No.2231-5063**

Golden Research Thoughts Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial board.Readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.aygrt.isrj.org

ISSN No-2231-5063 Vol.1,Issue.IX/March 2012pp.1-4

Research Paper

Effect Of Sodium Fluoride Toxicity On Oxygen Consumption Rate In Freshwater Edible Fish, Rita Rita

[1]Somnath Kshirsagar, [2]Archana Injal and [3]K.R.Rao
[1] K.N. Bhise college of Arts and Commerce, Kurduwadi, Solapur.
[2]Gogate Joglekar College, Ratnagiri.
[3]Walchand College of Arts and Science, Solapur.

ABSTRACT

In the present investigation effect of sodium fluoride toxicity on oxygen consumption rate of freshwater edible fish, Rita rita was studied. Freshwater fish Rita rita exposed to acute concentration of sodium fluoride. Sodium fluoride is act as protoplasmic poison. Freshwater fish Rita rita showed gradual decrease in oxygen consumption from the starting period of exposure to till the end of the experiment. Alterations in oxygen consumption may be due to respiratory disturbances. The effect is time and dose dependent.

KEY WORDS:

sodium fluoride, oxygen consumption, *Rita rita* .

INTRODUCTION:

Fish is a good indicator of aquatic contamination because its biochemical stress responses are quite similar to those found in mammals (Mishra and Shukla, 2003). Aquatic pollutants enters into the fish mainly through gills. The changes in the respiratory activity is an indicator response to environmental stress in fish. In aquatic body toxicants present above the normal level i.e., at lethal concentrations bring about mortality of fish and also increase the rate of oxygen consumption in survived fish (Tilak *et al*., 2005). Depletion in oxygen content occurs in the medium when pesticides, chemicals, sewage and other effluents containing organic matter are discharged into water bodies.

Joshi and Kulkarni (2007) studied the effect of cypermethrin and fenvalerate on the changes in the oxygen consumption of freshwater fish, *Garra mullya*. Thathaji *et al.*, (2008) studied the feect of Butachlor and Mechete on oxygen consumption in fish, Channa punctatus. Fluoride ions acts as protoplasmic poison and living cells tolerate this in very low concentrations (Pack, 1971) . Hence the present study was undertaken to evaluate the toxicity of sodium fluoride on freshwater fish, *Rita rita*.

MATERIAL AND METHODS

To study the effect of sodium fluoride on oxygen consumption rate in freshwater fish, *Rita rita* (total length 10-12 cm, weight 20-30 g) were obtained from Bhima river, Solapur district, Maharashtra. Fishes were acclimated to the laboratory in large size glass aquarium for 10 days. The static bioassay test were perform by using analytical grade sodium fluoride to determine LC_0, LC_{10}, and LC_{50} values for 24, 48, 72 and 96 hours. Experimental and control fishes were kept in separate air tight jars for one hour without any disturbance. Approximately 300 ml water was siphoned out from respiratory jars into stopper reagent bottle. Oxygen content from these jars was determined by the standard , Wrinkler's method. (Welsh and Smith, 1961). The oxygen consumption was determined at intervals of 24,48,72 and 96 hours. The difference between the oxygen content before experiment and after one hour was calculated as mg of oxygen consumption/hour/gram of body weight per liter. The changes in the rate of oxygen consumption from LC_0, LC_{10}, and LC_{50} were compared with control group for percentage variation.

RESULTS –

The oxygen consumption rate of freshwater fish, *Rita rita* after acute exposure to sodium fluoride is summarized in table no -1

Table No -1

Exposure time	Control	LC_0	LC_{10}	LC_{50}
24	0.105 ± 0.008	0.090 ± 0.002 (14.28)	0.088 ± 0.004 (20)	0.077 ± 0.009 (26)
48	0.101 ± 0.01	0.073 ± 0.011 (27.72)	0.058 ± 0.013 (42.57)	0.060 ± 0.11 (40.59)
72	0.116 ± 0.003	0.050 ± 0.006 (56.89)	0.040 ± 0.011 (58.62)	0.033 ± 0.009 (71.55)
96	0.088 ± 0.0003	0.049 ± 0.007 (44.31)	0.028 ± 0.007 (68.18)	0.020 ± 0.002 (77.27)

Bracket values indicate percent change when compared with control.

The rate of oxygen consumption showed by control group at 24 hour it was 0.105±0.005, mg/l/hr/gm, at 48 hour it was 0.101± 0.01 mg/l/hr/gm, at 72 hours it was 0.116± 0.003 and at 96 hours it was 0.088±0.003 mg/l/hr/gm. Upon exposure to LC_0 concentration of sodium fluoride the rate of oxygen consumption at 24 hour it was 0.090± 0.002, at 48 hour it was 0.073± 0.011 mg/l/hr/gm, at 72 hours it was 0.050± 0.006 and at 96 hours it was 0.049±0.007 mg/l/hr/gm. Upon exposure to LC_{10} concentration of sodium fluoride the rate of oxygen consumption at 24 hour it was 0.088± 0.004, at 48 hour it was 0.058± 0.013 mg/l/hr/gm, at 72 hours it was 0.040± 0.011 and at 96 hours it was 0.028±0.007 mg/l/hr/gm. Upon exposure to LC_{50} concentration of sodium fluoride the rate of oxygen consumption at 24 hour it was 0.077± 0.009, at 48 hour it was 0.060± 0.011 mg/l/hr/gm, at 72 hours it was 0.033± 0.009 and at 96 hours it was 0.020±0.002 mg/l/hr/gm.

When compared with control values after 24 hour exposure of sodium fluoride there was significant decrease in oxygen consumption rate in LC_0 which was 14.28%, in LC_0 which was 20 % and in LC_{50} which was 26%. When compared with control values after 48 hour exposure of sodium fluoride there was significant decrease in oxygen consumption rate in LC_0 which was 27.72%, in LC_{10} which was 42.57 % and in LC_{50} which was 40.59%. When compared with control values after 72 hour exposure of sodium fluoride there was significant decrease in oxygen consumption rate in LC_0 which was 56.89%, in LC_0 which was 58.62 % and in LC^{50} which was 71.55%. When compared with control values after 96 hour exposure of sodium fluoride there was significant decrease in oxygen consumption rate in LC^0 which was 44.31%, in LC_{10} which was 68.18 % and in LC_{50} which was 72.27%.

DISCUSSION –

In the present investigation experiments were conducted to study the variations in the oxygen consumption due to acute toxicity effect of sodium fluoride to freshwater fish, *Rita rita* observed overall decrease in the rate of oxygen consumption from all experimental groups when compared with control group. Exposure to sodium fluoride results in decrease in respiratory activity of the gill. Marge and Patil (2000) observed dereased rate of oxygen consumption due to endosulfan toxicity to the fish, *Puntitus ticto*. Mishra *et al*., (2006) observed decline in oxygen consumption of air breathing fish, *Channa punnctatus.* Joshi and Kulkarni (2007) observed decreased oxygen uptake of a fish, *Garra mullaya* after exposing to after exposing to cypermethrin and fenvelarate and stated that due to adverse effects on gills might be responsible of disruption of oxygen uptake. Similar might be the reason in the present investigation where there is considerable reduction in oxygen consumption from the fish, *Rita rita* after exposing to sodium fluoride.

Gayatri and Sultana (2010) studied the impact of polycyclic aromatic hydrocarbons in oxygen consumption of freshwater fish, *Tilapia mossambica* and observed variations in oxygen consumption and stated that even low concentrations of hydrocarbons creates respiratory disturbance which ultimately leads to the deterioration of health of fish. From the above discussion it can be concluded that decline in respiratory rate of fish might be due to poisoning of sodium fluoride.

REFERENCES –

1.Thathaji, P.B., Tilak, K.S., Verraiah, K., Butchiram, P.S. and Bhaskar Rao (2008) : Effect of butachlor and machete (50% EC) on oxygen consumption in the fish, Channa punctata (Bloch). Ind. Jour. Comp.Ani. Physiol. 26 (1) : 67-20.
2.Tilak, K.S, Veeraiah, K and Thathaji, P.B. (2005) : Histopathological changes in gill tissue of the fish, Channa punctatus exposed to sub lethal concentration of butachlor and machete an herbicide. Jour. Aqua. Biol. 20 (1) : 111-115.
3.Pack, M.R. (1971) : Environmental Science Technology (5) – pg 128.
4.Joshi, P.P. and Kulkarni G.K. (2007) : Changes in the oxygen consumption of a freshwater fish, Garra mullya (Skyes) exposed to cypermethrin and fenvalerate. Him. J. Env. 21 (1) : 7-13.
5.Gayathri, V. and Sultana, M. (2010) : Impact of polycyclic aromatic hydrocarbons (PAHS) on oxygen consumption of freshwater fish, Tilapia mossambica (Oreochromis mossambica). J. Auqa. Biol. 25 (1) : 164-166.
6.Mishra, R. and Shukla, S.P. 2003. Endosulfan effects on muscle malate dehydrogenase of the fresh water *catfish Claria batrachus*. Ecotox. Environ Safe., 425-433.
7.Mishra, R. and Shukla, S.P. 2003. Endosulfan effects on muscle malate dehydrogenase of the fresh water *catfish Claria*

batrachus. Ecotox. Environ Safe., 425-433.
8. WELSH, J. H. AND R. I. SMITH. 1972 *"Labpratory Exercise in Invertebrate physiology",* Burgess publishing Co., Minneapolis.

Somnath Kshirsagar
K.N. Bhise college of Arts and Commerce, Kurduwadi, Solapur.

Publish Research Article
International Level Multidisciplinary Research Journal
For All Subjects

Dear Sir/Mam,

We invite unpublished Research Paper,Summary of Research Project,Theses,Books and Book Review for publication,you will be pleased to know that our journals are

Associated and Indexed,India

- International Scientific Journal Consortium
- OPEN J-GATE

Associated and Indexed,USA

- EBSCO
- Index Copernicus
- Publication Index
- Academic Journal Database
- Contemporary Research Index
- Academic Paper Databse
- Digital Journals Database
- Current Index to Scholarly Journals
- Elite Scientific Journal Archive
- Directory Of Academic Resources
- Scholar Journal Index
- Recent Science Index
- Scientific Resources Database
- Directory Of Research Journal Indexing

Golden Research Thoughts
258/34 Raviwar Peth Solapur-413005,Maharashtra
Contact-9595359435
E-Mail-ayisrj@yahoo.in/ayisrj2011@gmail.com
Website : www.aygrt.isrj.org