IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DNA, RNA CONTENT IN FRESHWATER FISH *CTENOPHARYNGODON IDELLA* EXPOSED TO AN ORGANOPHOSPHATE PHENTHOATE 50% EC

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Abstract:

The pesticides and fungicides have been recognised as one of the serious pollutants of the aquatic ecosystems with deleterious effects on the living resources. Many pesticides and fungicides reported to produce a number of biochemical changes in fish both at lethal and sub lethal levels. Present study phenthoate exposed to *Ctenophanrydon idella* in sublethal concentrations for 24h, 5and 10days of test fish in different tissues the DNA and RNA content controls 24h brain (18.32)(2.47) (2.04) muscle (12.56) (1.03),(0.82) gill(12.18) (2.05)(1.91) kidney (12.14)(2.75) (1.72) and liver (9.34)(4.21)(3.67) and RNA content in controls and sublethals liver(4.67)(4.13)2.87 muscle (4.14)(3.75)2.57 brain (3.94)(2.620) 2.05 gill (3.68) (3.02)(2.27) and kidney (3.05)(2.73)(1.99)respectively

Keywords: Phenthoate, *Ctenopharyngodon idella* DNA ,RNA and sublethal concentrations

Introduction:

Water toxicology have been distinct as the observe the chemicals and other lethal agent in aquatic organisms with unusual stress on adverse or harmful effects. It is deceptive that adding of chemicals by humans to the earth superficial introduces and increasing environmental stress for organisms and fishes in particular areas. Dispersion of the pollutant results in pollution of natural global areas while water runoff transfers' quantities to fresh water zones and oceans. Toxicants like insecticide and other chemicals invention their ways into the fresh water bodies and have been produced unexpected consequences on aquatic animals. Among the pollutants, pesticides rank very important location, since pesticides and technical organic chemicals contain the most dangerous group of pollutants

Materials and Methods:

Fish *Ctenopharyngodon idella* of size 6±7 cm and 6.5± 2 g weight were brought from a local fish farm Kuchipudi, Guntur District of Andhra Pradesh, India and acclimatized at 28 ± 2^0C in the laboratory for 15days. Such acclimatized fish were exposed to sublethal and lethal concentrations of Phenthoate (50%EC) commercial grade for 24h, 5 and 10 days. The vital tissues like muscle, brain, liver, gill and kidney of the fish were taken for the estimation of Nucleic acids (DNA & RNA), The nucleic acids, Deoxyribose (DNA) and Ribose (RNA) were estimated bythe method of Searchi and Maclinnis (1970)

The DNA content in24hr control fish *Ctenopharyngodon idella* in different tissues was in the order of:

Brain> Muscle >Gill > Kidney> Liver

The DNA content in 24hr sublthal and lethal concentrations Phenthoate(50% EC) fish *Ctenopharyngodon idella* in different tissues was in the order of:

Phenthoate 50% EC sublethal 24hr : Brain >Gill >Kidney>liver>Muscle

Phenthoate 50% EC lethal 24hr : Brain >Gill >Kidney>liver>Muscle

Phenthoate 50% EC for 5 and 10 days it was found that the gill, liver, kidney and muscle DNA content was decreased but the brain DNA content was found to increase. The decreasing order of DNA content in different tissues in the order of:

Phenthoate 50% EC 5 days controls: Liver>Brain >Gill >Kidney>Muscle

Phenthoate 50% EC Sublethal 5days: Liver>Kidney >Brain >Gill >Muscle

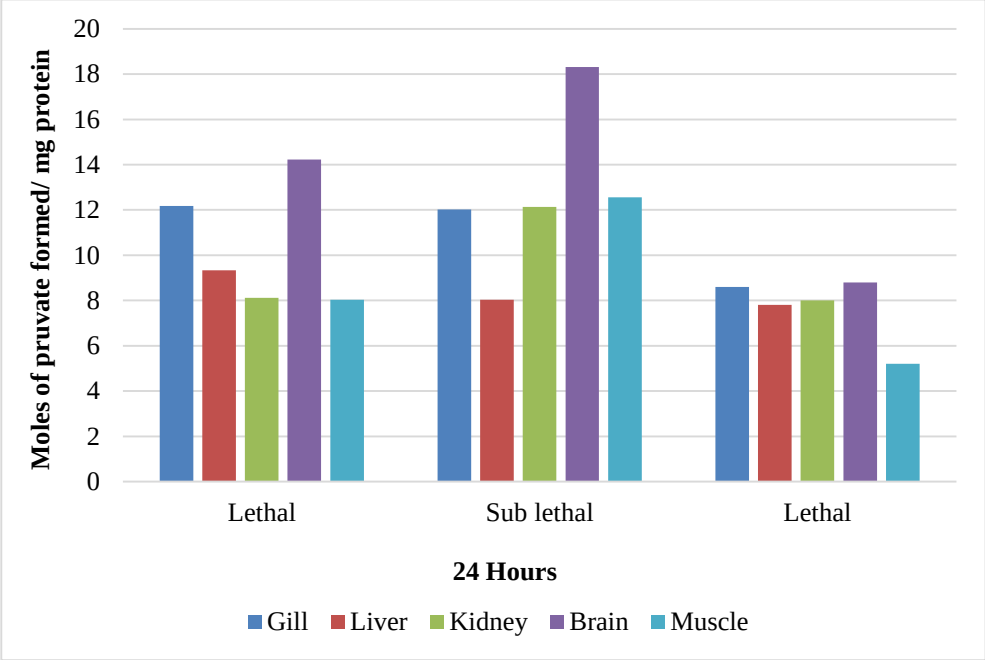
Phenthoate 50% EC 10days controls: Liver >Brain >Gill >Kidney >Muscle

Phenthoate 50% EC Sublethal 10 days: Liver >Brain >Gill >Kidney >Muscle

Changes in the DNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal and lethal concentrations of Phenthoate 50% EC for 24hr:

DNA Tissues	Control	Sublethal (mg/g)	% Change	lethal(mg/g)	% Change
Gill	12.18 ±0.011	12.02 ±0.03	-1.31	8.60 ±0.12	-29.4
Liver	9.34 ±0.014	8.04 ±0.05	-13.92	7.80 ±0.01	-16.49
Kidney	12.14 ±0.07	8.12 ±0.023	-33.11	8.01 ±0.15	-34.01
Brain	18.32 ±0.12	14.23 ±0.065	-22.32	8.80 ±0.24	-51.96
Muscle	12.56 ±0.01	8.03 ±0.042	-36.06	5.20 ±0.03	-58.59

Values are the mean of five observations ;(±) indicates the standard deviation:
Values are significantly at $P< 0.05$



Changes in the DNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal and lethal concentrations of Phenthoate 50% EC for 24hr:

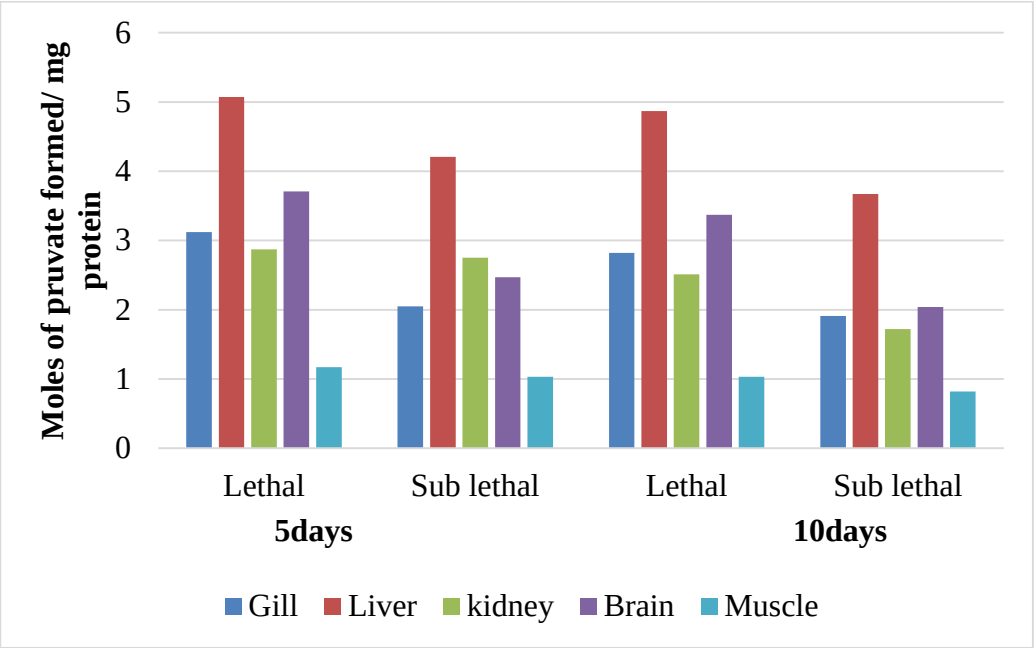
Changes in the DNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal concentrations of Phenthoate 50% EC for 5 and 10 days:

DNA Tissues	5 days			10days		
	Control	Sublethal (mg/g)	% Change	Control	Sublethal (mg/g)	% Change
Gill	3.12 ±0.01	2.05 ±0.04	-34.29	2.82 ±0.08	1.91 ±0.01	-32.26
Liver	5.07 ±0.04	4.21 ±0.015	-16.96	4.87 ±0.05	3.67 ±0.08	-24.64
Kidney	2.87 ±0.12	2.75 ±0.03	-4.18	2.51 ±0.08	1.72 ±0.05	-31.47
Brain	3.71 ±0.05	2.47 ±0.32	-33.42	3.37 ±0.05	2.04 ±0.12	-39.46
Muscle	1.17 ±0.07	1.03 ±0.07	-11.96	1.03 ±0.02	0.82 ±0.03	-20.38

Values are the mean of five observations ;(±) indicates the standard deviation:

Values are significantly at $P< 0.05$

Fig: Changes in the DNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal concentrations of Phenthoate 50% EC for 5 and 10 days:



RNA:

The calculated values of nucleic acid content RNA, along with standard deviation and the percent change over the control fish were presented in Table. and Fig The RNA content in 24hrs control fish *Ctenopharyngodon idella* in different tissues was in the order of:

Liver>Kidney >Muscle>Brain > Gill

Under exposure to sublethal and lethal concentrations of Phenthoate 50% EC for 24 hr it was found that the gill, liver, kidney, brain and muscle. RNA content was decreased but the Kidney RNA content was found to increase. The decreasing of RNA content in different tissues is in the order of:

Phenthoate 50% EC lethal 24 hrs: Liver> Muscle> Gill > Brain>Kidney

Phenthoate 50% EC 24 hrs: Liver > Muscle >Brain > Gill>Kidney

Under exposure to sublethal concentrations of Phenthoate 50% EC for 5 and 10 days it was found that the gill, liver, kidney, and muscle. RNA content was decreased but the brain RNA content was found to increase. The increasing order of RNA content in different tissues is in the order of:

Phenthoate 50% EC 5 days control: Liver > Muscle >Brain > Gill>Kidney

Phenthoate 50% EC sublethal 5 days: Liver > Muscle> Gill > Kidney >Brain

Phenthoate 50% EC 10 days control: Muscle>Liver>Gill>Brain>Kidney

Phenthoate 50% EC sublethal 10 days: Liver >Muscle > Gill> Brain > Kidney

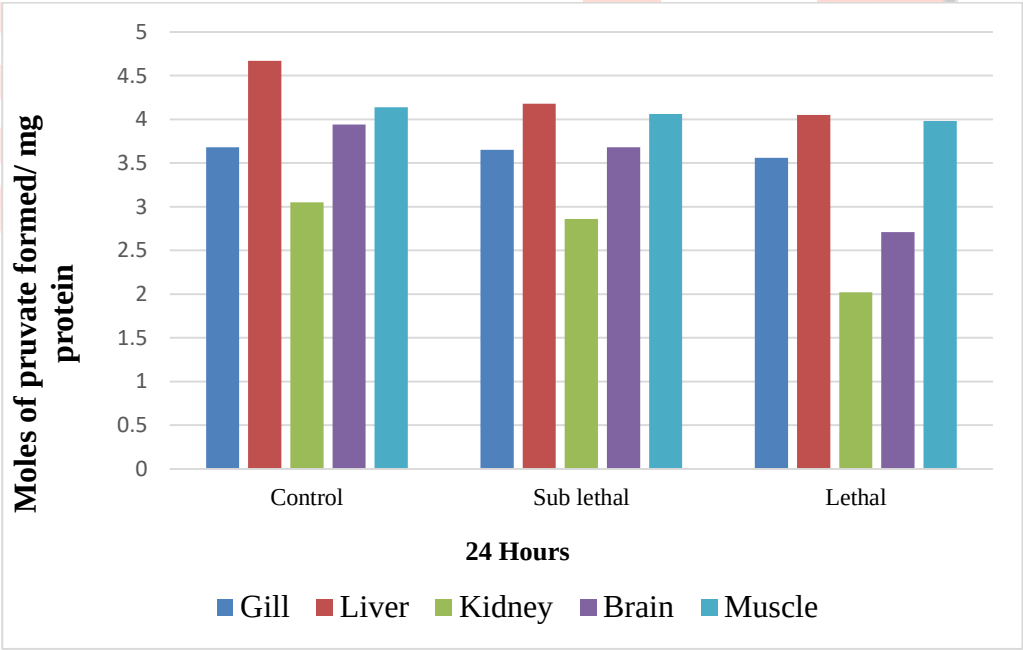
Changes in the RNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal and lethal concentrations of Phenthoate 50% EC for 24hr:

RNA Tissues 24hr	Control	Sublethal (mg/g)	% Change	Lethal (mg/g)	% Change
Gill	3.68 ±0.01	3.65 ±0.02	-0.81	3.56 ±0.15	-3.26
Liver	4.67 ±0.03	4.18 ±0.15	-10.49	4.05 ±0.26	-13.27
Kidney	3.05 ±0.05	2.86 ±0.03	-6.22	2.02 ±0.05	-33.77
Brain	3.94 ±0.14	3.68 ±0.24	-6.59	2.71 ±0.05	-31.22
Muscle	4.14 ±0.05	4.06 ±0.01	-1.93	3.95 ±0.04	-4.58

Values are the mean of five observations ;(±) indicates the standard deviation:

Values are significantly at $P< 0.05$

Changes in the RNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal and lethal concentrations of Phenthoate 50% EC for 24hr:



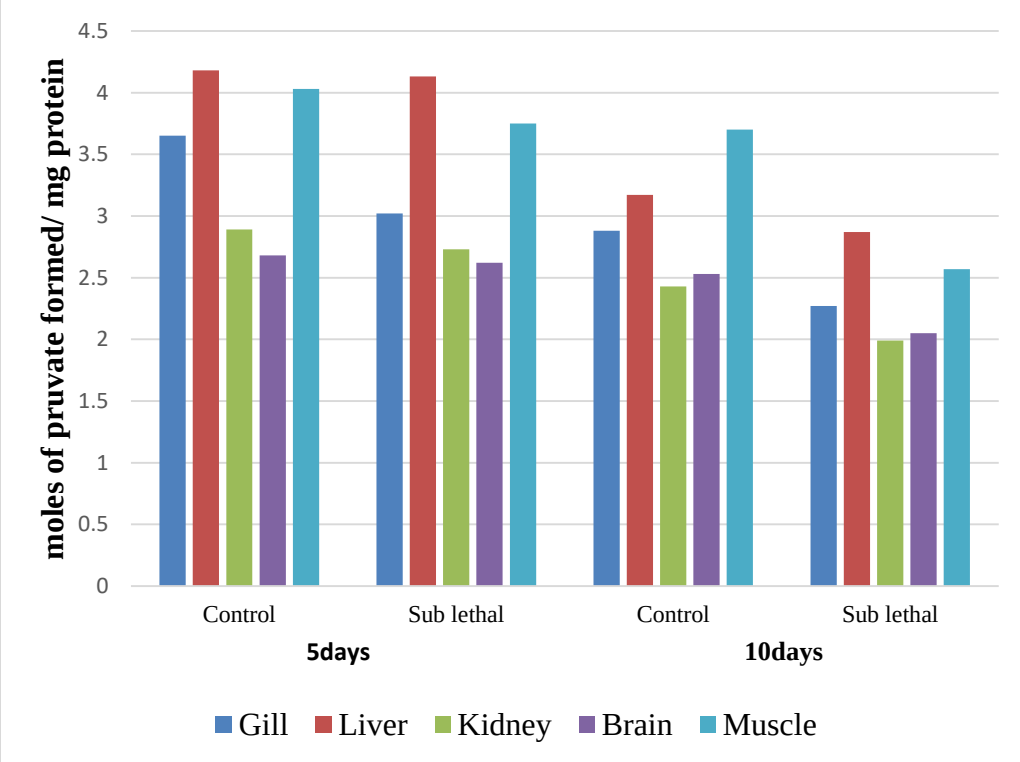
Changes in the RNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal concentrations of Phenthoate 50% EC 5 and 10 days:

RNA Tissues	5 days			10 days		
	Control	Sublethal (mg/g)	% Change	Control	Sublethal (mg/g)	% Change
Gill	3.65 ±0.02	3.02 ±0.04	-17.26	2.88 ±0.02	2.27 ±0.32	-21.18
Liver	4.18 ±0.15	4.13 ±0.08	-1.19	3.17 ±0.05	2.87 ±0.12	-9.46
Kidney	2.89 ±0.03	2.73 ±0.01	-5.53	2.43 ±0.08	1.99 ±0.05	-18.10
Brain	3.68 ±0.24	2.62 ±0.05	-28.80	2.53 ±0.13	2.05 ±0.07	-18.97
Muscle	4.03 ±0.01	3.75 ±0.32	-6.94	3.70 ±0.24	2.57 ±0.05	-30.54

Values are the mean of five observations ;(±) indicates the standard deviation:

Values are significantly at $P< 0.05$

Changes in the RNA (mg/g wet weight of the tissue) and % change over the control, in different tissue of the freshwater fish, *Ctenopharyngodon idella* exposed to sublethal concentrations of Phenthoate 50% EC for 5 and 10 days:



Present study Phenthoate caused variability in the nucleic acids content in different tissues and the degree of variability or extent of alterations caused by the Phenthoate DNA ratio also followed the same increasing trend as RNA content along with the increase in dietary protein level during the whole experimental period (Zhang *et al.*, 2017). Decrease of RNA might also be due to interference in the incorporation of precursor in the nucleic acid synthesis or inhibition of the RNA polymerase

function (de Paula Brandao *et al.*,2020). Might supported by the pesticide-mediated reduction in protein contents in various tissues including blood of other species of fish, (Jin Y *et al.*,2011). Phenthoate caused variability in the nucleic acid content in different tissues and the grade of variability depends on Phenthoate (50%EC). The decreasing order of DNA content in different tissues in the order of: Gill, Liver, Muscle, Brain, Kidney and RNA, (Katti Ravi Babu.,(2021).

Increase in RNA content of gill was (Gracy and Rajasekar, 2012) there are no significant changes in DNA levels in liver and muscle but RNA level was significantly increased in liver and muscle tissues of *Channa striata* treated with dietary pyridoxine (Akhtar *et al.*,2012). According to Ravikiran and Kulkarni (2015) the level of DNA and RNA was found to decreased in brain, liver, gonads and kidney of *N.notopterus* fish due exposure to copper sulphate it indicates toxicity effect on nucleic acid synthesis. The RNA content was decreased fish *Labeo rohita* in different tissues were exposed to pesticides (Monali Chakraborty and Deepronil Roy,2017). The DNA and RNA contents have been studied in gill, liver and brain of a common carp, *Cyprinus Carpio* exposed to cadmium chloride and lead acetate (Neelima *et al.*, 2017).

Many researchers observed the decreased RNA in the lethal and sub lethal concentration. Anitha A.,(2015) observed decrease RNA content in fish *Labeo Rohita* exposed to Phenthoate. Nirmala. K., (2016) Observed decrease RNA content in freshwater fish *Ctenopharyngodon idella* exposed to phosalone. Decreased RNA content was observed in freshwater fish *Ctenopharyngodon idella* exposed *to* Profenofos, (Hari babu.G.2017). Rajeswari., (2020) RNA content was decreased in *Ctenopharyngodon idella* exposed to Cyhalothrin. Ch Prassana (2018) decreased RNA content was observed Ethion exposed to *Labeo rohita* lethal and sub lethal concentration.

Decreased content in *Labeo rohuta* exposed to Profenofos and Carbosulfan Nagaraju B,(2014) decreased RNA content in all the tissues along with RNA content in liver and brain, it was increased in gill due to cadmium and lead toxicity. DNA and RNA content were decreased in liver, brain and gill tissues of *Channa puntatus* treated with pyrethroid, due to inhibitory action of synthetic pyrethroid on DNA synthesis machinery or increased degradation, reported by (Tripathi and Singh, 2013).

CONCLUTION:

This toxicity test on the effect to phenthoate on *Ctenopharyngodon idella* a rapid method for assessing the phenthoate impact on this fish. This type of preliminary investigations can be useful for deriving the safe level of phenthoate concentration that can be released into the aquatic environments. A number of chemicals, associate with DNA damage, have been tested on live marine animals, isolated tissues or different cell types. These chemicals were grouped into for classes:(1) chemicals whose metabolites cause DNA damage.(2) Chemicals act directly on DNA.(3) Chemicals prevent DNA synthesis and repairs. (5) Chemicals that prevent DNA synthesis and repair, many chemical and toxins. DNA damage by multiple mechanism. The result observe in present-day study reveals phenthoate (50%EC) caused

variability in the nucleic acid content in changed tissued and the grade of inconsistency by the phenthoate (50%EC)was less compared to and found to the dose dependent.:

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