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Dimethoate-Induced Changes in Biochemical Parameters of Experimental Fish (*Oreochromis mossambicus*) and it's Neutralization by *Eleusine coracana* (Finger Millet)

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A B S T R A C T

There is a considerable interest in detailed study of biochemical damage to biological systems due to pesticide exposure. However, there is a lack of consensus as to which determinations are best used to quantify future risk of xenobiotic exposure and the use of natural plant products as antioxidant interventions. A purpose of this study was to investigate the effect of dimethoate on biochemical parameters in fish *Oreochromis mossambicus* as well as possible role of *Eleusine coracana* in attenuation of dimethoate-induced changes. The fishes were divided randomly into 3 groups and kept at 5 fishes per group. The first group was served as a control and the group 2 was induced with a dose of dimethoate 0.40mgl (1.60mg/l) for 96 hr in second group, the group 3 fishes were pretreated with powder of *Eleusine coracana* as food 10mg two times per day for 96 hr. *Eleusine coracana* protected against dimethoate-induced biochemical analysis protein and carbohydrate were significantly ($P<0.01$) increased and neutralized harmful effects of dimethoate.

Introduction

Pesticides first became widely used in the beginning of the 20th century with the development of intensive agriculture. By the early 20th century, pesticides were primarily used. These included botanical and natural chemicals derived from plant material and inorganic salts which were widely used as fungicide, herbicide and insecticides. Now a days the increasing world population demands increasing supply of food. So it is imperative to intensify agricultural production. Pesticide and fertilizers play a central role in agriculture and contribute to enhance food production worldwide. Since the 1940s, the use of pesticides has increased at a rate of 11 % annual, reaching 5Mt in 1995. Globally, about 2.5 Mt of pesticide are applied yearly to control pest

organisms (Souvanny Phommakone, 2004; Rainboth). Dimethoate is an organophosphate insecticide with contact and systemic actions used against a broad range of insects in agriculture and also for fly control. It was introduced in 1956 and produced in many countries. Organophosphate affects the nervous system. Others may irritate the skin or eyes.

This research neutralization by *Eleusine coracana* (Millet) was designed to study against toxicity of dimethoate. Dimethoate can accumulate and magnify biologically in aquatic and terrestrial food chains and food webs. The effect of pesticide residues on human health also therefore consume aquatic organism in the nature.

Material and Methods

Collected pesticide and plant material

Dimethoate and seeds of *Eleusine coracana (Finger millet)* were collected from local market at Kancheepuram-Tamilnadu. The collected samples were preserved in dark and dry place at ambient temperature with passive ventilation prior to extraction.

Preparations of *Eleusine coracana* extracts and Stock solution of dimethoate

Eleusine coracana were cleaned with deionized water, oven dried at 40°C for 72 h and powdered in a grinder. The plant material (100 g) was extracted water (1500 ml) using Soxhlet apparatus for 48h at temperature not exceding the boiling point of the respective solvents. The obtained extracts were filtered using Whatmann filter paper No.1 and concentrated under vacuum at 40°C using a rotary vacuum evaporator to dryness. The solvent was evaporated under reduced pressure to give the maximum percentage yield from *Eleusine coracana* millat with mixed fish food. And Stock solution of dimethoate was prepared in acetone 0.40(1.60Mg/L). Now *Eleusine coracana* extracts and dimethoate stock solution were ready for use experimental work.

Procedure of test methods

Live specimens of adult freshwater *Oreochromis mossambicus* fish (both sex, body wt 30-42 g) were collected locally from Thiruppanankadu Lake (Thiruvannamalai district). They were kept into large plastic tanks containing 100 liters of dechlorinated tap water for acclimatization for 15 days. The physicochemical characteristics of the tap water used are as follows: pH 7.42 ± 0.08, dissolved oxygen 8.24 ± 0.18 mg/l, temperature 20.26 ± 1.32 C, hardness 160.8 ± 5.32 mg/l, and electrical conductivity 286.36 ± 60.42 μmho/cm, respectively. The fishes were divided randomly into 3 groups and kept at 5 fishes per group. The first group was served as a control. The 2nd group was induced with a dose of dimethoate 0.40mgl (1.60mg/l) for 96 hr. The 3rd group fishes were pretreated with powder extract of *Eleusine coracana* as mixed food 10mg two times per day for 96 hr. The fishes 2nd & 3rd group fishes was four days static renewal neutralize and toxicity test was performed to determine the LC50 values of dimethoate and *Eleusine coracana*.

The stock solution of dimethoate was prepared in acetone 0.40 (1.60Mg/L) and the desired concentration was obtained by diluting with tap water for preparation of test solution. 2nd containing five fishes were subjected to dimethoate at concentration of 0;0.40., 0.80., 1.20., 1.60.mg/L. Control groups, each having five fishes kept in tap water containing acetone (0.40 ml per liter) was run concurrently. Before the group 3rd group fishes was treated dimethoate stock solution. After the experimental 3rd group

fishes were treated *Eleusine coracana* extracts. All experiments were carried out in cylindrical glass aquaria containing 30 liters of test solution. Dimethoate Solution and *Eleusine coracana* extracts (control and test) were renewed daily and dead fishes were immediately removed. At different exposure periods (24, 48, 72 and 96 hr), the biochemical changes of the fish was observed. The biochemical changes protein and carbohydrate of the fish was subjected to calculate the LC50 and upper and lower confidence limits at 95% level.

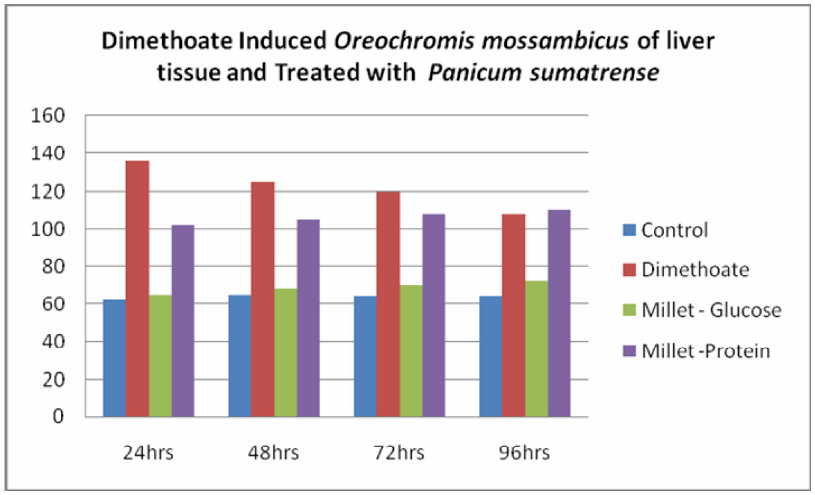
Results and Discussion

The medicinal value of *Eleusine coracana* plants lies in some chemical substances that produce a definite physiological effect on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, phenolic compounds and flavonoids. Among these, flavonoids are the ubiquitous group of plant secondary metabolites demonstrating a wide range of biochemical and pharmacological effects, including anti-diabetic, antioxidant, antiinflammatory, antibacterial, and antifungal. In the present study, we focused on two different types of assays that are protein and carbohydrates using extracts from genders of were carried out *Eleusine coracana* and compared with standards (Tuduri *et al.*, 2006).

Table.1 Dimethoate induced *Oreochromis mossambicus* of liver tissue and treated with *Eleusine coracana*

Time(hrs)	Control	Dimethoate Induced	Millet treated Glucose	Millete treated Protein
24	62.54 ± 5.21	136.42-2.60	65.24 ± 4.98	102 ± 2.05
48	65.50 ± 4.25	125.2-3.45	68.25 ± 4.01	105 ± 3.15
72	64.66 ± 4.86	120.00-2.84	70.08 ± 4.50	108 ± 2.15
96	64.83 ± 2.84	108.83-5.14	72.15 ± 4.11	110 ± 4.75

Fig.1 Dimethoate induced *Oreochromis mossambicus* of liver tissue and treated with *Eleusine coracana*



From the present study it seems that the freshwater, *Oreochromis mossambicus* fish is more susceptible to dimethoate toxicity as the LC50 value for this organophosphate is less than other reported fish species. These results indicate that dimethoate exposure to the fish caused toxic effects. Further such fishes (having accumulated dimethoate in their body) may affect the human being after consuming the fish as food.But we take food *Eleusine coracana* (Millet) seed per day 5 – 10 mg, definitely nutralized to dimethoate toxine and other more pesticides effect.

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