



## Evaluation of *Cuminum cyminum* and *Coriandrum sativum* on Profenofos induced nephrotoxicity in Swiss albino mice

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### ABSTRACT

Now a day's various types of organophosphate compound are being utilised by farmers in massive amount to increase the productivity of crops by destroying the insecticides. Profenofos is one of the organophosphate which is widely used by the farmers. It is largely known to cause toxicity in various organs, such as the liver and brain. So, to evaluate the effect of Profenofos, experiment was designed on Swiss albino model. So, the present study aims to observe the effect of *Cuminum cyminum* (Cumin) and *Coriandrum sativum* (Coriander) on kidney exposed with Profenofos on female swiss albino mice. The parameters utilized for the study were through biochemical analysis. The impact of herbal plants Cumin and Coriander were observed on the Profenofos induced nephrotoxicity. The study shows Cumin was more effective in normalizing the Uric acid level rather than Coriander, while the coriander is more effective in normalizing the creatinine level than Cumin. Thus, the study shows better cytoprotection to kidney in Profenofos induced nephrotoxicity in Swiss albino mice.

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### Introduction

Pesticide is a massive poisoning substance; spread a major global health problem and killing 250–350 000 people each year (Jeyaratnam, 1990; Gunnell, 2007). Profenofos [O-(4-bromo-2-chlorophenyl) O-ethyl S-propyl phosphorothioate] is a organophosphorus insecticide and was developed for pest strains resistant to other organophosphorus insecticide (Worthing, 1979). Due to its wide use in control of insects and mites on many different crops, humans are inevitably exposed to its residues in various ways. Profenofos has been classified as moderately hazardous (toxicity class II) pesticide by WHO and it has a moderate order of acute toxicity following oral and dermal administration (WHO, 1990-1991). The acute toxic action of Profenofos is the inhibition of the acetyl cholinesterase activity (Fukuto, 1990), resulting in toxicity also in humans (Jokanovic, 2001). Biochemical signs of hepatocellular injury and disturbed amino acid metabolism may be of value as markers of exposure to Profenofos, (Gomes et al., 1999). Moreover, high doses of the Profenofos induce tissue vacuolization and haemorrhage while swelling of Bowman's capsules and tubular degeneration in the kidney were well reported by (Fawzy, et al., 2007). Profenofos can induce oxidant stress which may be earlier diagnostic index in Profenofos poisoning (Lin, et al., 2003). Therefore, the aim of this study was to observe the phytoremedial impact of Coriander and Cumin on Profenofos induced nephrotoxicity.

*Cuminum cyminum* (cumin) and *Coriandrum sativum* (coriander) is annual herb currently cultivated in many countries (Blumenthal, et al., 2000). Different parts of the plant, including the fruits and the green herbs, are used for medicinal purposes such as dyspeptic complaints and loss of appetite (Blumenthal, et al., 2000).

Cumin (*Cuminum cyminum* L.) is an aromatic plant and its fruit, known as cumin seed and is most widely used spices and medicinal plants in the world. In indigenous medicine, cumin seeds have long been considered as a stimulant and are used for therapeutic purposes (Jacobellis, 2005). Pharmacological studies in animals have shown that coriander has anti-diabetic (Swanston, et al., 1990., Gray, et al., 1999), and anti-cancer effects (Chithra, 2000) antibacterial (Burt, 2004; Cantoreet et al., 2004; Kubo, 2004), antioxidant (Wangenstein, et al., 2004), and antimutagenic (Chithra et al., 2000) activities. Coriander fruits are used as a spice, the juice of fresh leaves and the tea of powdered fruits of coriander are recommended for relief of anxiety, insomnia and sedative or for relief of nervousness, have also been indicated (Duke, 2002).

### Materials and methods

#### Animals

Twenty four female Swiss albino mice with average body weight ranging from 28g to 32g were obtained from animal house of Mahavir Cancer Institute & Research Centre, Patna, India (CPCSEA Regd. No. 1129/bc/07/CPCSEA, dated 13/02/2008). Food and water to mice were provided *ad libitum* (prepared mixed formulated feed by the laboratory itself). Animal were housed in colony rooms with 12 hrs light/dark cycle at 22 ± 2° C.

#### Chemicals

Commercially available Profenofos, [O-(4-bromo-2-chlorophenyl) O-ethyl S-propyl phosphorothioate] (50% E.C, specific gravity 1.34, trade name: "Carina", PI Industries Ltd.) was purchased from the local market.

#### Plant materials

*Cuminum cyminum* (Cumin) is an annual herb belonging to family Apiaceae. It is slender branched stem 20–30 cm tall. The

leaves are 5–10 cm long, pinnate or bipinnate, thread-like leaflets. *Coriandrum sativum* (Coriander) also known as Chinese parsley or cilantro is an annual herb in the family of Apiaceae native to the eastern Mediterranean region and southern Europe (Li and Jiang, 2004). Fresh coriander leaves were collected from the local garden of Patna while Cumin seeds were purchase from local herbal store in Patna, India. The identity of the leaves of Coriander and seeds of Cumin was confirmed by Prof. A.K. Roy, PG Department of Botany, TMBU, Bhagalpur, Bihar, India. The coriander leaves were washed with distilled water and extract was made by dissolving it in distilled water using mortar and pistal. The dose was finally made to 1000 mg/kg body weight for oral administration. The Cumin seeds were dried and were then powdered and extract was made by dissolving it in distilled water using a mortar and pistal. The dose was made to 100mg/kg body weight for oral administration.

#### Treatment protocol

The animals were grouped into two groups in which one was Control and another was Profenofos treated. The Profenofos treated group were administered Profenofos @ 25mg/b.w. for 30 days to observe the Profenofos induced nephrotoxicity after calculating the LD<sub>50</sub> value. The same profenofos treated group were further divided into three subgroups, in which one was left as Profenofos control while the rest two groups were administered Cumin and Coriander @ 100 mg/Kg b.w and 1000 mg/ Kg b.w respectively.

#### Biochemical analysis

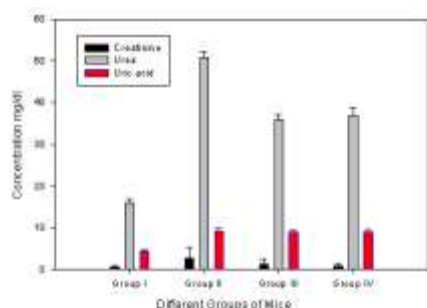
After the entire treatment protocol, the blood was collected by orbital sinus puncture (Van, et al., 1998) from above mentioned experimental animals groups. The Kidney Function Test (KFT) Urea, Uric acid, and Creatinine were performed from blood serum; Urea was performed by Berthelot Method, (Berthelot, 1859; Fawcett, 1960) Creatinine (Bones, et al., 1945; Toro, et al., 1975).

#### Statistical analysis:

Results are presented as mean  $\pm$  S.E and percentage degree of reversal against hepatotoxin by test. Total variation present in a set of data was analysed through one-way analysis of variance (ANOVA). Difference among means has been analysed by applying Dunnet's 't' test at 99.9% ( $P < 0.001$ ) confidence level. Calculations were performed with the GraphPad Prism Program (GraphPad Software, Inc., San Diego, USA).

#### Results

The biochemical assessment shows the nephroprotective activity of Cumin (*Cuminum cyminum*) and Coriander (*Coriandrum sativum*). In comparison to Control mice group Creatinine, Urea and Uric acid were increased in profenofos treated group and profenofos control group. But, in Cumin & Coriander treated group it shows declination in the level of Creatinine & Urea level but Uric acid was still increased (Table – I).



#### Discussion

Pesticides are widely used for killing pests persisting in environment and that may be accumulated in human body through various food chains. The merge quantity of such insecticides gradually increase in the body which become the cause of many human disease like gastric cancer, cytogenetic damage, kidney infections and others (Anna et al., 1988).

The present study shows the protective effect of Cumin (*Cuminum cyminum*) and Coriander (*Coriandrum sativum*) against the Profenofos induced nephrotoxicity. The Profenofos induced nephrotoxicity showed elevated levels of Creatinine, Urea and Uric acid while after administration of Cumin & Coriander the declination in the levels of the KFT parameters were observed.

Mogda et al., 2009, has only reported that after Profenofos exposure causes biochemical changes in rats especially the free radicals. While Chauhan et al., (2010) have observed the immunomodulatory effect of cumin. Jabeen et al., (2009) have reported the diuretic properties of *Coriander*

Although Profenofos is not highly toxic but it is rapidly metabolized and four different types of metabolites, in which Desethylate profenofos is probably the most toxic compound. These metabolites are highly toxic (Miyuki Gotoh et al 2001).

Thus, from the entire study it can be concluded that inflow of pesticide in the body cannot be checked but utilizing antidotes like Cumin & Coriander can be the best solution against their toxicity. Hence, Cumin & Coriander play vital role to combat the Profenofos induced nephrotoxicity.

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**Table I Effect of Cumin and Coriander seeds on serum Creatinine, Urea and Uric Acid on Profenofos treated Swiss albino mice**

Group	Creatinine (mg/dl)	Urea (mg/dl)	Uric Acid (mg/dl)
Group I (Normal Control)	0.5± 0.05	16.0± 1.0	4.4± 0.6
Group II (Profenofos)	2.66± 0.1	50.66± 1.6	9.3± 0.7
Group III (Profenofos Control)	2.46± 0.16	40.00± 2.0	5.0± 0.5
Group IV (Cumin )	1.3± 0.05	36.00± 1.0	9.0± 5.0
Group V (Coriander)	1.5± 0.05	36.92± 1.92	9.1± 5.0