ABSTRACT
In recent years there is an immense pressure on farmers to harvest more grains for growing population. For higher production they are extensively using the pesticides which are hazardous to human health. As such, it becomes necessary to evaluate the effect of these pesticides on human health and search for a subsequent protective agent against there hazardous effects. In the present investigation an organophosphate (profenofos) was administered @ 25mg/Kg b.w for 30 days to swiss albino mice to observe its effect on liver. Further, *Cuminum cyminum* and *Coriandrum sativum* extracts were administered to the profenofos intoxicated group @ 100mg/Kg b.w and 1000 mg/Kg b.w respectively for 30 days to evaluate their protective efficacy. An elevated level of liver function test (LFT) was observed in profenofos intoxicated group in comparison to the control. However, the two antidotes administered group showed decreasing trend of LFT. The finding suggests the vital role of the plant extracts in reducing the hepatotoxicity at the cellular and biochemical levels. Of the two medicinal plants, cumin was found to be more effective for its hepato-protective role than that of Coriander.

Key words: Liver, Profenofos, *Cuminum cyminum* and *Coriandrum sativum*, LFT, Swiss albino mice.

INTRODUCTION
Profenofos (O-(4-bromo-2-chlorophenyl) O-ethyl S-propyl phosphorothioate) is a natural and toxic organophosphorous insecticide [11,17]. Effect of Profenofos on animal occurs through food and water (WHO, 1990). It is largely known to cause toxicity in liver and kidney. Profenofos causes different symptoms of toxicity and biochemical changes in the enzyme activity of the liver and brain following two sub lethal doses of profenofos in mice [24]. Certain organophosphorous are also associated with carcinogenesis. Since, DNA damage has been correlated with cancer development [12], genotoxic studies have been carried out on organophosphorous [7,9,23]. It has also been reported that organophosphorous can induce oxidative stress by generating free radicals and altering antioxidant levels of the free radical scavenging enzyme activity [26]. Cumin (*Cuminum cyminum*) seeds have anti-carcinogenic properties. In one study, it was observed that cumin prevents the development of stomach or liver tumours in laboratory animals. This cancer-protective effect may be due to cumin's potent free radical scavenging abilities and its effect to enhance liver detoxification enzymes [10]. Coriander (*Coriandrum sativum*) is used as an antispasmodic, carminative and stimulant. Coriander is also used for the treatment of measles, stomach-ache, nausea, hernia [3].

MATERIALS AND METHODS
Animals:
Thirty female swiss albino mice (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). The research work was approved by the IAEC (Institutional Animal Ethics Committee) with no. IAEC/2010/08/05. Food and water to mice were provided *ad libitum* (prepared mixed formulated feed by the laboratory itself). Animals were maintained 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. Commercially available kit for Chemical analyses like SGPT, SGOT, AKP, ALP, Urea, creatinine, creatine phosphokinase, glucose, cholesterol, HDL, LDL, total protein, albumin, globulin were purchased from Labindia Investigational Laboratory, Patna, India.

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Arun Kumar et al. / Protective Effect of Cuminum cyminum and Coriandrum sativum on Profenofos Induced Liver Toxicity

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 of the Apiaceae native to the eastern Mediterranean region and southern Europe [16]. Fresh coriander leaves were collected from the local garden of Patna while cumin seeds were purchased from local herbal store in Patna, India. The identity of the leaves of coriander and seeds of cumin was confirmed by Dr. Ramakant Pandey (Botanist), Department of Biochemistry, Patna University, Patna, Bihar, India. The coriander leaves were washed with distilled water and extract was made by dissolving it in distilled water using mortar and pestle. 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 pestle. The dose was made to 100mg/kg body weight for oral administration.

Treatment Protocol:
The animals were grouped into four sub-groups-control, profenofos treated, cumin treated and coriander treated. The profenofos treated group was administered @ 25mg/b.w. for 30 days to observe the Profenofos induced hepatotoxicity. Upon profenofos treated group then cumin @ 100 mg/kg b.w and coriander @ 1000 mg/Kg b.w was administered for 30 days.

Biochemical Analyses:
After the entire treatment protocol the experimental animals were sacrificed. Blood was collected by orbital sinus puncture method. Serum Glutamic Pyruvate Transaminase (SGPT) and Serum Glutamic Oxaloacetate Transaminase (SGOT) activities were measured according to the method described [22], while Bilirubin activity was measured according to the method described [15].

Statistical analysis: Results are presented as mean ± S.D and 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

SGPT, SGOT and Bilirubin activity: Hepatic damage induced by Profenofos caused significant (p< 0.001) increase in marker enzymes SGPT, SGOT and serum bilirubin. Oral administration of cumin and coriander significantly (p < 0.001) lowers the levels of marker enzymes SGPT and SGOT. It also lowers serum bilirubin level (Fig 1,2 &3)
DISCUSSION
Liver is the major site of metabolism, resulting in inactivation of exogenous chemicals or xenobiotics to non-toxic metabolites. Due to high metabolic capability and the portal blood supply, toxic responses occur relatively frequent in the liver compared to other organs.

In the present study, serum transaminases were used as an index of hepatocellular injury in study of profenofos induced intoxication. Generally, the serum transaminase level reflects the level of hepatic necrosis. The profenofos induced toxicity increased the levels of SGPT and SGOT. The low dose of cumin and coriander effectively protect the liver damage as evident from the decreased activities of serum transaminases. Thus, cumin and coriander treatment restores the normal SGPT and SGOT levels.

Bilirubin is an endogenous anion derived from haemoglobin degradation. Bilirubin in the body maintains balance between production and removal of pigments in body. Hyperbilirubinemia results from the overproduction or impaired uptake, conjugation or excretion/regurgitation of unconjugated or conjugated bilirubin from hepatocytes and its release to bile ducts. Increased bilirubin level in the profenofos treated mice indicates hepatic injury. However, the administration of cumin and coriander it showed significant decrease in bilirubin level. Such finding reflects hepato-protective activity of cumin and coriander. In recent years, hypolipidemic effect[6], immunomodulatory effect[2], antibacterial effect[1,5,20,21], antioxidant and hepatoprotective properties[25], anti-inflammatory effect[14], anti-diabetic effects[19] and diuretic properties[13] of cumin and coriander have been well reported. The reports shows, biochemical changes in rats especially the free radicals on profenofos exposure[18]. From the aforesaid findings it can be concluded that extracts cumin and coriander have the great capability to normalize the physiological activities of the body as well as restoration of cellular status of liver. Profenofos at one hand damages the vital tissues of the body at great extent. The cytoprotective properties of these medicinal plant extracts restores the cellular integrity. The essential oils of cumin and coriander are playing the vital role to ameliorate the profenofos induced toxicity. Thus, both the medicinal plants show the hepatoprotective role. Furthermore, among the two medicinal plant extracts used, cumin was found to be more effective in its hepatoprotective role rather than coriander. The entrance of hazardous pesticide (profenofos) into our body cannot be checked but by the use of cumin and coriander extracts as potent antidote can solve the problem to great extent, normalizing the physiology of the body in general and restoring the cellular status of vital organs of the body.

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REFERENCES


