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جامعة المرقب

العدد التاسع عشر
يوليو 2021م

هيئة تحرير
مجلة التربوي

- المجلة ترحب بما يرد عليها من أبحاث وعلى استعداد لنشرها بعد التحكيم .
 - المجلة تحترم كل الاحترام آراء المحكمين وتعمل بمقتضاها .
 - كافة الآراء والأفكار المنشورة تعبر عن آراء أصحابها ولا تتحمل المجلة تبعاتها .
 - يتحمل الباحث مسؤولية الأمانة العلمية وهو المسؤول عما ينشر له .
 - البحوث المقدمة للنشر لا ترد لأصحابها نشرت أو لم تنشر .
- (حقوق الطبع محفوظة للكلية)



ضوابط النشر:

- يشترط في البحوث العلمية المقدمة للنشر أن يراعى فيها ما يأتي :
- أصول البحث العلمي وقواعده .
 - ألا تكون المادة العلمية قد سبق نشرها أو كانت جزءا من رسالة علمية .
 - يرفق بالبحث تزكية لغوية وفق أنموذج معد .
 - تعدل البحوث المقبولة وتصحح وفق ما يراه المحكمون .
 - التزام الباحث بالضوابط التي وضعتها المجلة من عدد الصفحات ، ونوع الخط ورقمه ، والفترات الزمنية الممنوحة للتعديل ، وما يستجد من ضوابط تضعها المجلة مستقبلا .

تنبيهات :

- للمجلة الحق في تعديل البحث أو طلب تعديله أو رفضه .
- يخضع البحث في النشر لأولويات المجلة وسياستها .
- البحوث المنشورة تعبر عن وجهة نظر أصحابها ، ولا تعبر عن وجهة نظر المجلة .

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Effect cinnamon plant on liver of rats treated with trichloroethylene

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ABSTRACT

Background & Aims: cinnamon (CNN), a plant phenolic compound, is widely used as a spice and coloring agent in food. Recently, CNN, had been considered to possess antioxidant activities. This study aimed to investigate whether CNN, protect against trichloroethylene (TCE)-induced hepatotoxicity and to demonstrate its possible mode of action.

Methods: A group of male rats were treated with TCE (5mg/1000 ml of drinking water) to induce liver injury. The CNN group was fed 25 g mixed with the diet (2.5Kg) concomitantly with 5 mg TCE/1000ml drinking water, for 8 weeks. The rat were killed after treatment period of 8 weeks, and samples of livers tissue were fixed immediately in 10% formalin.

Results: *Histopathological changes*

It was obviouse that TCE administration has shown dramatic injures in the liver tissues, and the treatment with cinnamon can activate these injures to advanced level.

Introduction

Nowadays, there is an increasing interest in the protective function of dietary antioxidants, which play important role in the protection against oxidative stress. (CNN) cinnamon, also known by Cassia, Sweet Wood, and Gui Zhi, is traditionally harvested in Asian countries (Leung, 1996; Toriizuka, 1998). Many studies have shown the diverse biological functions of CNN including anti-inflammatory (Lee et al., 2005), anti-oxidant (Singh et al., 2007), anti-microbial (Matan et al., 2006), and anti-diabetic effects (Qin et al.,



2003). An anti-tumor effect of CNN was previously suggested in vitro (Schoene et al., 2005) without in vivo evidence or a working mechanism.

Phenol compounds present in (CNN) spices that show natural anti-oxidant properties have been studied for substitution of synthetic anti-oxidants, due to possible side effects of synthetic anti-oxidants which may in some circumstances act deleterious to animal organisms (Pratt, 1992).

TCE is a major environmental contaminant, especially in drinking water, which provokes occupational and general concern for the population because of its widespread use and designation as a probable human carcinogen (IARC, 1995). TCE induces free radical-mediated oxidative tissue damage that eventually leads to a high incidence of acute toxicity or tumors in the liver and kidney of humans and rodents (Lash and parker, 2001). It has been shown that the amount of TCE and the period needed for the occurrence of hepatic injury in mice were 600-2400mg/kg/day, via gavage, for 4 weeks (Merrick et al., 1989), 500-2000mg/kg/day orally for 28 days (Goel et al., 1992), and 2.5-5.0 mg/ml of drinking water for 4-8 weeks (Griffin et al., 2000).

The present study was thus designed to investigate the protective activity of CNN, against TCE-induced liver injury.

Materials and methods

Chemicals: Pure TCE was purchased from Sigma Chem. Co.(St. Louis, MO, USA). Powdered CNN, was purchased from Libya spice market.

Diets: Standard diet was prepared from Casein(20%), Starch (32%), Sucrose (33%), Cellulose (5%), Corn oil (5%), and Vitamin / Mineral (5%), (Abd-Allah ,2003).

Animals and Treatments:

15 males albino Wister rats (weight range 58 – 160 g) were used for the experimental study. Animals were obtained from Helwan animal station, Ministry of Heath, Egypt .

- Experimental animals were divided into 3 groups of 5 rats each.

Group 1 : -(Normal) rats were given basal diet and water for 8 weeks.

Group 2 : -(Trichloroethylene) rats were given 5% TCE in drinking water for 8 weeks.

Group 3 : -(Trichloroethylene + cinnamon) rats were given 5% Trichloroethylene in drinking water and cinnamon at 25 g mixed with the diet (2.5Kg) for 8 weeks.



histopathological examination

After 8 weeks of treatments, rats were killed by Anesthesia and Liver was fixed in 10 % formalin for histopathological examination and the routine heamatoxylin and eosin staining technique. The specimens were washed under running tap water over night to remove the formalin. They were dehydrated in ascending series of alcohol, processed through xylene-alcohol and then cleared in two changes of xylem, 30 minutes each. They were transferred into a mixture of xylene and melted paraffin for 1 hour and then into two pure paraffin changes, 30 minutes each for infiltration. The specimens were embedded in pure paraffin to form blocks. Serial sections were cut at a thickness of 5 microns using rotary microtome. Sections were stained in haematoxylin and eosin according to Drury and Wallington (1967).

Histopathological examinations and microscopical pathology have been carried out in Zoology Department, Damietta Faculty of Science, Mansoura University.

RESULTS

Liver histopathology:

Histopathological changes in the liver of rats treated with cinnamon, and Trichloroethylene were studied after 8 weeks of treatment.

A - Normal liver:

Section of normal rats showed the normal structure of the liver tissue. The main structural component of the liver is hepatocyte. These hepatocytes are disposed in plates that are interconnected in such a way to show, in the light microscope sections, structural units, the liver lobules. The liver lobule is formed of a polygonal mass of tissue with centrally located central vein and some portal spaces at the periphery of the lobule, each containing a veinule (a branch of the portal vein); an arteriole (abranched of the hepatic artery); and ductile (part of a bile duct system (figures 1,2)

B. Liver of treated rats: The following findings are demonstrated in liver of treated rats.

1. Histopathological findings in the liver of TCE- treated rats:

Histopathological examination of the liver sections of trichloroethylene treated rats showed necrosis, fibrosis and hyperplasia in most of the portal areas are seen in all examined livers (figure3). Also, lymphatic infiltration, in most of the portal areas is seen in all examined livers (figure4).



3. Histopathological findings in the liver of CNN- treated rats:

The sections of the liver from rats treated with CNN alone showed normal histology with no evidence of pathological damage (figure5).

Administration of cinnamon to TCE treated rats has shown marked improvement in liver tissue structure. The sections of the liver from rats treated CNN to TCE showed focal necrosis (figure6).

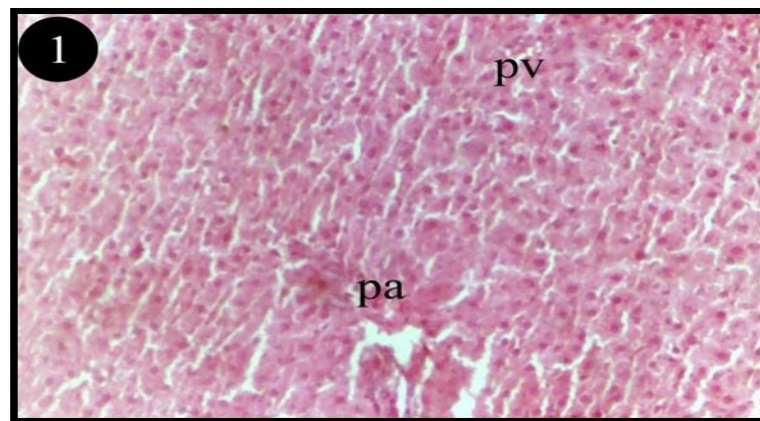


Fig. 1 : A photomicrograph of the liver of normal rats showing normal structure. Note: Pa, Portal artery and pv, portal vein. (Haematoxylene and eosin stain, Magnification X20).

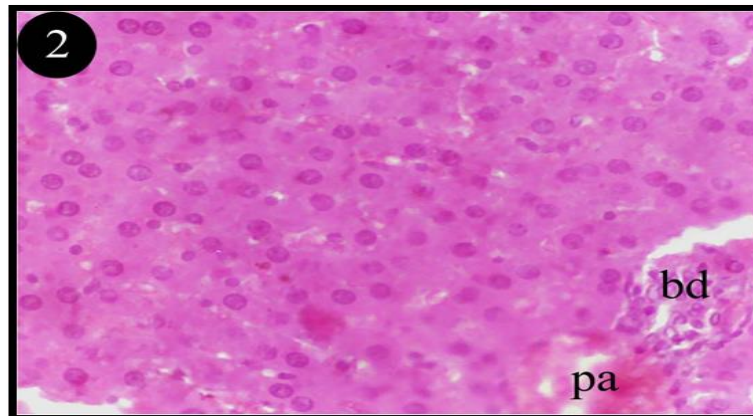


Fig. 2 : A photomicrograph of the liver of normal rats showing normal structure. Note: Bd, Bile duct and pa, Portal artery. (Haematoxylene and eosin stain, Magnification X40)

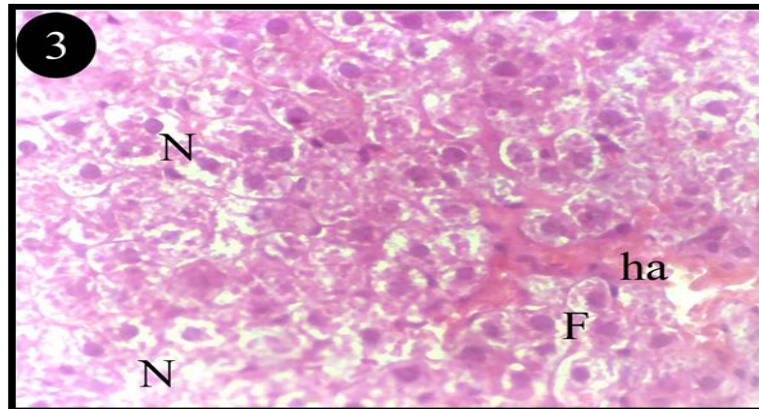


Fig. 3 : A photomicrograph of the liver of TCE-treated rats showing focal necrosis of hepatocytes (N), the presence of fibrotic tissues (F) and hayperplasia (ha). (Haematoxylene and eosin stain, Magnification X40).

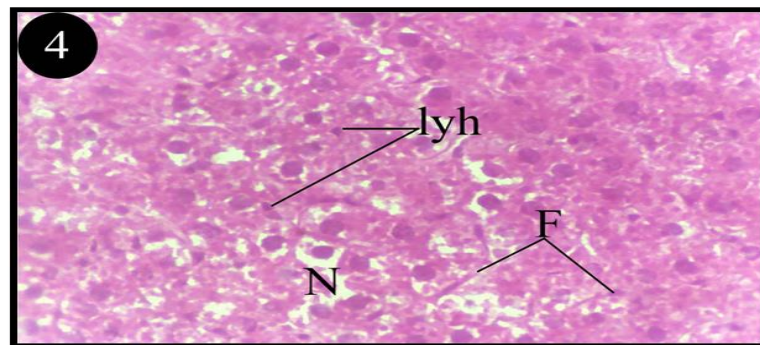


Fig. 4: A photomicrograph of the liver of TCE-treated rats showing focal necrosis of hepatocytes (N), the presence of fibrotic tissues (F) and Iyedig cell hyperplasia (lyh). (Haematoxylene and eosin stain, Magnification X40).

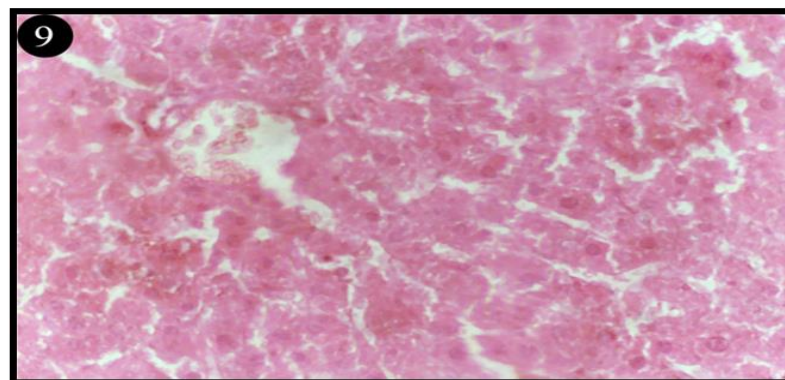


Fig. 5: A photomicrograph of the liver of Cinnamon treated rats showing normal structure of hepatocytes. (Haematoxylene and eosin stain, Magnification X40).

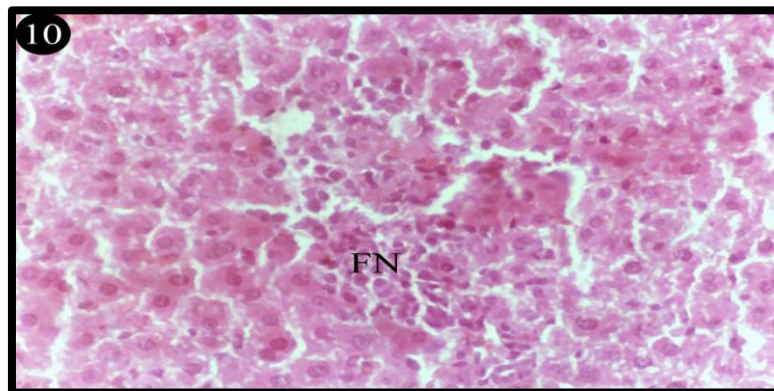


Fig. 6: A photomicrograph of the liver of Cinnamon and TCE treated rats showing focal necrosis of hepatocytes. (Haematoxyline and eosin stain, Magnification X40).

Discussion

Many histopathological changes in the liver may be induced in rats treated with TCE. In the present study, TCE treated rats showed necrosis, fibrosis, hyperplasia and lymphocyt infiltration of the liver.

These results are in agreement with that of Stulnig et al. (2002) which showed necrosis, inflammatory infiltrations of the livers obtained from TCE. In addition of Elcombe et al. (2002) reported the liver cell enlargement (hypertrophy) in the rat, but both hypertrophy and hyperplasia (cell proliferation) in the mouse (after TCE administration by gavage for 10 consecutive days, at doses of 500 to 1500 mg/kg body wt) were observed. Also, Melnick et al. (2004) showed that individual cell necrosis in the liver, and hepatic microsomal NADPH cytochrome c reductase and peroxisomal palmitoyl-CoA oxidase and catalase activities were found in both the dosed-fed and gavage groups. When add Gelatinsorbitol microcapsules containing 44.1% trichloroethylene (TCE) were prepared and mixed in NIH-07 rodent meal diet and provided at microcapsule concentrations of 0 (untreated control group), 1.25, 2.5, 5.0, or 10% (equivalent to 0, 0.55, 1.10, 2.21, or 4.41% TCE, respectively) to groups of 10 males F344 rats for 14 days.

Concerning cinnamon treatment concomitantly with TCE, histopathological examinations have revealed the presence of necrotic foci in the liver tissue, i.e. the treatment with cinnamon improves with limitation the hepatotoxicity of TCE. These findings in agreement with Moselhy and Husien (2009) demonstrated the histological architecture of liver sections of the rats treated with CNN extracts showed more or less



normal patterns, with a mild degree of fatty change, necrosis and lymphocyte infiltration, almost comparable to those of the control group.

Treatment of diabetic rats with cinnamon and ginger spices or their essential oils and mixtures exhibited improvement in liver and kidney functions compared to diabetic rats. The treatment also resulted in a significant improvement in lipid profile, liver functions and kidney function (Hassanen, 2010).

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