

The Effect of Eruca Saliva Alcoholic Extract in Decreasing the Induced Toxicity of Liver and Kidney in Mice

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ABSTRACT

This study is aimed to investigate the effect of ethanolic extract of Eruca Sativa leafs in liver and kidney enzymes of mice. Thirty male albino mice average weight 25gm were divided into 5 groups included group1 (normal diet), group2 (injected with carbon tetrachloride CCl₄), group3 (injected with CCl₄ + 0.5mg/ml Eruca sativa extract), group4 (injected with CCl₄ + 1mg/ml Eruca sativa extract), and group5 (injected with CCl₄ + 2mg/ml Eruca sativa extract). Serum liver and kidney functions tests were estimated. The results showed that Eruca Sativa extracts at concentration 2mg/ml improved liver and kidney functions. We concluded that, Eruca sativa extracts may exert their prophylactic and treatment role against oxidative stress produced by CCl₄ by increasing/maintaining the levels of antioxidant molecules and antioxidant enzymes.

Key words: Eruca Sativa, Liver, Enzymes

تأثير المستخلص الكحولي لـ Eruca sativa في تقليل السمية المستحثة بـ CCl₄ للكبد والكلية في الفئران

الخلاصة

هدفت هذه الدراسة الى التحري عن تأثير مستخلص الجرجير الكحولي في عمل انزيمات الكبد والكلية لدى الفئران المصابة بمادة رابع كلوريد الكربون CCl₄، حيث تم استخدام مجموعة من الفئران (30) فأرا أبيض متوسط وزن الجسم 25غم. وقد قسمت هذه الفئران إلى خمسة مجاميع ليتم حقنها بمادة رابع كلوريد الكربون CCl₄ المعروفة بتأثيرها السمي على الكبد والكلية. المجموعة الأولى من الفئران تم تغذيتها على الغذاء العادي فقط في حين المجاميع الأربعة المتبقية تغذت على الغذاء العادي إضافة إلى 0.5 ، 1 و 2ملغم/مل من المستخلص الكحولي لأوراق نبات الجرجير بمعدل حقنة واحدة يوميا وبمقدار 0.01مل لكل تركيز ولمدة 7 يوم.

تم قياس التغيرات في الانزيمات GOT ، GPT و BloodUrea ، Creatinine لمصل
الفئران. لوحظ انخفاض مستوى الانزيمات GOT ، GPT و BloodUrea ، Creatinine
للفئران المجرعة بالمستخلص عند تركيز 2 ملغم/مل مقارنة مع الفئران غير المجرعة بالمستخلص
(مجموعة السيطرة).

فيما يتعلق بنتائج هذه الدراسة يمكن ان نخلص بالقول بأن مستخلص نبات الجرجير له دور
وقائي وعلاجي ضد إصابة الكبد المستحثة تجريبيا في الفئران، على الرغم من أن الدور الوقائي
لهذا المستخلص كان أكثر فعالية من القدرة على العلاج.

INTRODUCTION

There has been a great deal of interest in the role of complementary and alternative medicines for the treatment of various acute and chronic diseases[1]. Several hundreds of plants have been examined for use in a wide variety of liver disorders including *Eruca sativa* (ES) Family: *Cruciferae* that modulate oxidative stress due to its antioxidant properties[2]. Fresh *Eruca sativa* has a characteristic pungent flavor that is thought to be related to the presence of glucosinolates and their breakdown products, e.g: isothiocyanates[3]. *Eruca sativa* is an annual plant approximately 20-50 cm high, with dull-green leaves which have a distinct spicy-pungent flavor [4]. It is an increasingly popular vegetable in Central Europe and is spreading to other areas. *Eruca sativa* is easily grown and is thus suitable as an experimental plant which have several biological activities including anticarcinogenic, antifungal, antibacterial and antioxidant effects[5, 6, 7 and 8]. [9] indicated that *Eruca sativa* seeds and leaves possessed a potent free radical scavenging antioxidants and protected against oxidative damage by increasing maintaining the levels of antioxidant molecules and antioxidant enzymes.

Liver is the first organ to metabolize all foreign compounds and hence it is susceptible to many different diseases[10]. Coronary Heart Disease (CHD) is the leading cause of death in the UK [11]. According to the Medicine Health CHD in America kills as many people each year as the 'next 7 leading causes of deaths combined' Risk factors contributing to CHD range from uncontrollable factors such as age, heredity and gender through to areas of lifestyle and diet that can be influenced[12].

The kidneys are sophisticated reprocessing machines. Every day, a person's kidneys process about 200 quarts of blood to sift out about 2 quarts of waste products and extra water. The wastes and extra water become urine, which flows to the bladder through tubes called ureters[13].

The bladder stores urine until releasing it through urination. Most kidney diseases attack the nephrons, causing them to lose their filtering capacity. Damage to the nephrons can happen quickly, often as the result of injury or poisoning. But most kidney diseases destroy the nephrons slowly and silently. Only after years or even decades will the damage become apparent. Most kidney diseases attack both kidneys simultaneously[14].

Among the various mechanisms involved in the hepatotoxic effect of carbontetrachloride (CCl₄), one is oxidative damage through free-radical generation [15] and antioxidant property is claimed to be one of the mechanisms of hepatoprotective effect of indigenous drugs.[16] The *Eruca sativa* has antioxidant properties[17]. Hence, the objective of the study was to evaluate the effect of ethanolic extract of *Eruca sativa* on CCl₄-induced hepatotoxicity in mice.

MATERIALS AND METHODS

Plant extraction

The fresh leafs of *Eruca sativa* were collected from local market and air dried in the shade, grounded into a fine powder and then extracted with ethanol using sahxulate apparatus. The extracts of the leaf was evaporated to dryness in a rotary evaporator at 40°C. The crude extracts were obtained by filtration through Whatman No.1 filter paper. The filtrate was reduced to 25 ml and then autoclaved at 121°C and 15 lb pressure for 20 min. The extract was cooled and immediately use[18].

Animals

The animals used in this study were laboratory mice (males) *Mus musculus* Balb/C male adult mice (average weight of 25g and 8-12 weeks old), purchased from central health laboratory / Baghdad. There were 5 groups 6 mice in each group: group 1 served as negative control which received (normal diet), group 2 positive control (injected with CCl₄ 100mg/kg), group 3 (injected with CCl₄ + 0.5mg/ml *Eruca sativa* extract), group 4 (injected with CCl₄ + 1mg/ml *Eruca sativa* extract), group 5 (injected with CCl₄ + 2mg/ml *Eruca sativa* extract) intraperitoneal injection of a single daily dose in mice [19]. During the experiment (7days) the animals were fed by pellet and drinking water. The cage floor was covered with wood chips and sawdust. Animal cages were cleaned and disinfected twice a week.

Blood sampling and biochemical analyses

After 7 days of treatment, the mice were kept overnight fasting and killed by cervical dislocation, blood samples were collected by direct cardiac puncture under ether anesthesia and the serum was used for the assay of marker enzymes viz., aspartate aminotransferase (AST/GOT), alanine aminotransferase (ALT/GPT), Blood Urea and Creatinine. The enzyme levels were assayed using the standard kits from laboratories. The results were expressed as units/liter (U/l).

Statistical analysis

Data were expressed as means \pm S.E. and statistical analysis was carried using computerized SPSS program. Significance was performed using the least significant difference and paired Student "t" test according to Klug and Cummings [20].

RESULTS AND DISSECTION

Injection of *Eruca sativa* extracts had no effect on groups 3 and 4 studied parameters compared to control group (injected with CCl₄). Table (1).

Table(1) Effect of *Eruca sativa* extracts on the liver enzyme and kidney urea, Creatinine in albino mice treated with CCL₄.

Group	No. of Animals	GOT(U/I)	GPT(U/I)	Urea(mg/dl)	Creatinine (mg/dl)
Group-1(normal diet) M±SE	6	36.5±2.32	27.68±2.34	24.24±2.08	2.77±0.59
Group-2(injected with 0.01ml CCl ₄) M±SE	6	66.59±3.18***	71.72±1.86***	61.29±1.01***	6.86±0.15**
Group-3(injected with 0.01ml CCl ₄ + 0.5mg/ml <i>Eruca sativa</i> extract) M±SE	6	65.18±3.19***	70.99±1.12***	59.98±0.14***	5.73±0.32*
Group-4(injected with 0.01ml CCl ₄ + 1mg/ml <i>Eruca sativa</i> extract) M±SE	6	48.61±0.80*	58.9±0.82***	53.42±1.23***	5.33±0.26*
Group-5(injected with 0.01ml CCl ₄ + 2mg/ml <i>Eruca sativa</i> extract) M±SE	6	37.32±1.15 N.S	33.77±2.10 N.S	38.83±0.89*	3.12±0.12 N.S

M=mean SE=standard error

*** P < 0.01

** P < 0.025

* P < 0.05

The mean activities of serum liver enzymes GOT, GPT, Blood Urea and Creatinine were significantly increased in Group-2 (injected with CCl₄) compared to group-1(Normal diet), These results were in agreement with[21] who indicated that exposure of hepatocytes to ethanol alters the membrane structure and functions by increasing the leakage of enzymes into the circulation. Also, [22] reported that excess alcohol consumption has been linked with altered liver metabolism and liver damage, with leakage of cytoplasmic liver enzyme into the blood. While the mean values of GOT, GPT, Blood Urea and Creatinine were significantly decreased in group-5(injected with CCl₄+ 2mg/ml *Eruca sativa* extract) compared to group-2(injected with CCl₄). In addition, urea decreased in the tested meals compared to that of the control-fed group. The activities of GOT and GPT enzymes tended to decrease indicating improved liver function tests, Such reduction of liver enzyme activities with no effect on relative weight of liver and also reduction of urea concentration exhibit healthy, non-pathological and nontoxic effect of dietary

rocket diet. These results were in agreement with [23, 24], They reported that GOT and GPT activities were significantly decreased as the result of the studied treatments. As to rocket, this decrease may be due to their antioxidant status as reported by [25]. Similar results were obtained by [21] who indicated that administration of rocket caused improving in GOT, GPT activities in male rabbits, which may be due to the high content of sulfur in *Eruca sativa* that works as a cleansing of body wastes, clearing congestion like sinusitis and assisting liver and immune function. Several studies on phytochemical analysis of *Eruca sativa* leaf has shown the presence of many compounds to which antioxidant activity may be ascribed, these include glucosinolate, flavonoids (Quercetin, Kaempferol and isohamnetin), Carotenoids, Vitamine C [18].

In case of rocket inclusion, the decrease in blood urea may be due to the effective role of rocket isothiocyanates volatile oils as diuretic, [26] found that the ethanolic extract and volatile oil of *Eruca sativa* (rocket) seeds have been shown to act as diuretics in dogs and the oil significantly increased Na⁺, K⁺ and Cl⁻ extraction in urine.

Regarding the present study it could be concluded that *Eruca sativa* extracts possessed both prophylactic and therapeutic effects against experimentally induced liver injury in mice. However, the prophylactic role of these extracts was more potent than their treatment capacity.

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