

Effect of Dandelion on serum lipids in Male Albino Rats intoxicated with Oxytetracycline

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Abstract

Dandelion is a common plant widely used in many countries for its nutritional and medicinal benefits. The main target of this study was to investigate its effect in two different concentrations (2.5% & 5%) on blood lipids in male albino rats. The experiment was carried out using twenty-eight male albino rats. These rats were put on basal diet for one week before being divided into four main groups (seven rats each). Group 1: Negative control group continued basal diet during the whole experiment. Group 2: Positive control group was fed on basal diet for 28 days, then injected with Oxytetracycline for three consecutive days (120 mg/kg body weight) and continued on the basal diet till the end of the experiment. Group 3: continued as group 2 and after being injected rats were given Dandelion powder 2.5 % on the basal diet. Group 4: as the same of group 3 except that rats were given 5 % Dandelion powder. The study continued for one week after the injection of Oxytetracycline. At the end of the experimental period rats were fasted overnight and sacrificed; blood samples were collected from the aorta to determine lipids profiles. Besides, the biological parameters were recorded. The study concluded that diet fortified at 2.5% and 5% dandelion powder helped to improve blood lipid levels in rats compared with positive control groups (injected with oxytetracycline).

Key words: Total cholesterol – dandelion.

Introduction

Atherosclerotic disease causes over 19 million deaths annually worldwide, yet our understanding of the fundamental aspects of the genesis of the disease remains incomplete. Several studies have shown that an increased dietary intake of cholesterol results in hypercholesterolemia, which is known to eventually generate atherosclerosis and enhance the risk of coronary heart disease (CHD), fatty liver disease and cancer associated with hydroxyl radical formation. The etiology of atherosclerosis appears to be a multi-factorial series of events, but the oxidation of lipoprotein is believed to be a primary event in the pathogenesis of atherosclerosis. Thus, recent interest has been focused on strategies to enhance the removal of reactive oxygen species (ROS) by using antioxidants to enhance endogenous antioxidant responses (*Choi et al 2010*).

The genus *Taraxacum* Wiggers, family Asteraceae, subfamily Cichorioideae, tribe Lactuceae, commonly known as Dandelion, includes approximately 30–57 varieties with many microspecies, divided into nine sections (*Vašut & Majeský 2015*). Dandelion (*Taraxacum officinalis*), a traditional herbal medicine is used for treatment of jaundice and disorders of the liver, gallbladder and other various hepatic ailments

(You et al., 2010 and Ahmed et al., 2013). Conventionally, root and herb from *Taraxacum officinale* have been reported to be used for the treatment of various ailments, including liver and gallbladder disorders (Gulfraz et al., 2014 and Devaraj 2016).

This study aimed to find the protective effect of Dandelion on non-alcoholic fatty liver in albino male rats.

Materials and Methods

Materials:

Egyptian cultivar of Dandelion was purchased from Field Crops Research Institute, Ministry of Agriculture Giza, Egypt. Soybean oil and starch were purchased from the local market. Casein, cellulose, vitamins & minerals, dextrin, L-cysteine, choline chloride, and Cisplatin were obtained from the Cairo Company for Chemical Trading, Cairo, Egypt.

Twenty-eight male albino rats (Sprague Dawley strain) were obtained from the laboratory animal colony. Helwan, Cairo - Egypt. Weighting approximately between (150-180g). Kits used to determine cholesterol, triglycerides, LDL-C produced by Egyptian American Company for laboratory service and supplied by Alkan Company.

Methods:

Egyptian cultivar of dandelion was purchased from Field Crops Research Institute, Ministry of Agriculture Giza, Egypt.

Preparation for dried dandelion leaves:

The fresh dandelion leaves were washed with tap water then dried by cotton cloth to remove the excess water. The clean leaves were dried at 40 °C by Solar Energy and vacuum packaged until use. The leaves were ground into powder with a mill.

Experimental design:

Twenty-eight male Albino rats weighting (120 ± 15g) were put on basal diet for one week for adaptation prior to commencement of the experiment and housed in well aerated cages under hygienic condition. Water was introduced *ad-libitum*. After this week, rats were divided into 4 main groups (seven rats of each) fed on diets for eight weeks as follows: **Group 1:** Negative control group continued basal diet during the whole experiment.

Group 2: Positive control group was fed on basal diet for 28 days, then injected with Oxytetracycline for three consecutive days (120 mg/kg body weight) and continued on the basal diet till the end of the experiment.

Group 3: continued as group 2 and after being injected rats were given Dandelion powder 2.5 % on the basal diet.

Group 4: as the same of group 3 except that rats were given 5 % Dandelion powder.

Blood Sampling:

At the end of the experiment period, the rats were fasted overnight then anaesthetized and sacrificed and blood samples were collected from the aorta. Blood was left to coagulate then centrifuged at 3000 rpm for 15 minutes to obtain serum for each individual sample and then stored at -20°c for laboratory analyses. (Chapman et al., 1950)

Biochemical analysis of serum:

Serum samples were used for the determination of total cholesterol (*Allain et al., 1974*), triglycerides (*Fossati & Prencipe 1982*), HDL-C (*Lopes et al 1977*), LDL-C and VLDL-C were calculated by using the method of *Friedewald et al., (1972)*.

Statistical analysis:

Results are expressed as mean \pm SD. Data were statistically analyzed for variance using one-way analysis of variance "ANOVA" according to *Armitage & Berry, (1987)*. Computer software system SPSS (version 15) was used for these calculations.

Results and Discussion

Effects of dandelion on liver enzymes of rats (table 1)

Results revealed that, control positive group with oxytetracycline injection (120 mg/kg body wt.) showed a significantly higher ($P < 0.05$) value of AST & ALT compared with those of negative control group. This is attributed to the destructive effect of the drug on liver cells. However on feeding basal diet containing dandelion powder at 2.5% & 5% for six weeks} caused a significant reduction in the mean values of serum **Aspartateamine transaminase (AST)** and **Alanineamine transaminase (ALT)** compared to the positive control group.

Our results are in agreement with (*Helal, et al., 2012*) treated rats with oxytetracycline for three consecutive days caused fatty liver, necrosis and inflammation . These histological changes were associated with the high significant increase in activities of serum ALT, AST. They attributed, the significant increase may be due to rise in free radicals decrease in the antioxidant enzyme levels. The significant decrease in serum transaminases AST, ALT activities in dandelion treated group elucidates the hepatoprotective effect of dandelion (*Helal et al., 2012*) . The antioxidant, anti-inflammatory and free radical scavenging property of dandelion was ameliorated the effect of oxytetracycline on serum LDH activity through scavenge the free radicals, minimize lipid peroxidation, thereby preventing membrane damage and leakage of enzymes (*Helal et al., 2012*) . It was suggested that, dandelion may offer protection to the myocardium by preventing the lipid peroxidation of membrane bound polyunsaturated fatty acids, thus ensuring myocardial membrane function.

Table (1): Effect of feeding intoxicated rats with dandelion on serum liver enzymes

Groups	Paramaters	AST(u/l)	ALT (u/l)	ALK (u/l)
Control (- ve)		44.60 a ±0.55	33.00 a ±2.83	831.20a ±5.55
Control (+ ve) Oxytetracycline injection (120 mg/kg)		113.60d ±7.56	66.40 e ±1.82	850.80d ±3.84
Control (+ ve) & fed with basel diet +2.5 % Dandelion powder.		51.80bc ±4.92	38.80 b ±2.86	847.40cd ±2.07
Control (+ ve) & fed with basel diet +5 % Dandelion powder.		47.20ab ±2.49	36.80ab ±1.30	842.60bc ±6.19

Aspartateaminetransaminase (AST), Alanineaminetransaminase (ALT) and alkaline phosaphate (ALK) Values at the same column with different letters are significantly different at (p<0.05)

Effect of feeding dandelion powder on serum lipid profile of rats Triglyceride and total cholesterol (table 2)

Results in table 2 indicated significant rise of serum Triglyceride (TG) and Total Cholesterol (TC) of the control positive group compared with the negative control group. However, on feeding rats the basal diets containing 2.5% and 5% levels of dandelion induced significant decrease (p < 0.05) in triglyceride and total cholesterol. Previous studies by (Choi et al 2010), showed that the diet with dandelion leaf also lowered both levels of triglyceride and LDL cholesterol significantly. Triglyceride level was significantly lower in the dandelion root group than in the control group.

Table (2): Effect of dandelion powder on triglyceride and total cholesterol

Groups	Paramaters	Triglyceride mg/dl	Cholesterol mg/dl
Control (- ve)		106.40 ^a ±6.11	141.60 ^a ±8.62
Control (+ve) Oxytetracycline injection (120 mg/kg)		190.00 ^e ±5.09	252.00 ^c ±6.44
Control (+ ve) & fed with basel diet +2.5 % Dandelion powder.		144.60 ^d ±6.34	153.80 ^b ±5.40
Control (+ ve) & fed with basel diet +5 % Dandelion powder.		133.20 ^c ±5.63	149.20 ^b ±4.82

Values at the same column with different letters are significantly different at (p<0.05)

Effect of feeding dandelion powder on High density lipoprotein, low density lipoprotein and very low density lipoprotein (Table 3)

Results indicated that the positive control group were significantly higher in serum levels of low density lipoprotein and very low density lipoprotein and decrease in high density lipoprotein when compared with the negative control group. Rats which fed on diet fortified with dandelion powder at 2.5% and 5% had lower mean values of Low density lipoprotein cholesterol (LDL-C) and Very low density lipoprotein cholesterol (VLDL-C) compared with the positive control group. On the other hand, all treated groups with fortified diet at different levels of dandelion had higher mean values of High density lipoprotein cholesterol (HDL-C) compared with the positive control group. This was matching with previous studies by (Bhandari et al., 2005) and (Choi et al 2010). Dandelion leaf supplementation resulted in significant increase in the levels of HDL cholesterol. The diet with dandelion leaf also lowered both levels of triglyceride and LDL cholesterol significantly.

Table (3):
Effect of feeding experimental rats on Dandelion powder on High density lipoprotein cholesterol (HDL-C) ,
Low density lipoprotein cholesterol (LDL-C) and Very density lipoprotein cholesterol (VLDL-C)

Paramaters	HDL-C mg/dl	LDL-C mg/dl	VLDL-C mg/dl
Control (- ve)	45.00 ^e ± 2.23	75.32 ^a ±10.12	21.28 ^a ±1.22
Control (+ve) Oxytetracycline injection (120 mg/kg)	35.60 ^a ±1.51	178.40 ^d ±5.91	38.00 ^e ±1.02
Control (+ ve) & fed with basel diet +2.5 % Dandelion powder.	40.80 ^{bcd} ±1.30	84.08 ^{bc} ±4.61	28.92 ^d ±1.27
Control (+ ve) & fed with basel diet +5 % Dandelion powder.	43.20 ^{de} ±2.39	79.36 ^{ab} ±4.44	26.64 ^c ±1.13

High density lipoprotein cholesterol (HDL-C) , Low density lipoprotein cholesterol (LDL-C) and Very density lipoprotein cholesterol (VLDL-C)

Values at the same column with different letters are significantly different at (p<0.05)

The study concluded that dandelion powder helped to improve blood lipid levels in albino rats intoxicated with oxytetracycline.

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Abdelrehman M. Attia et al

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التأثير الوقائي للسريس على الدهون في الجرذان المصابه بالاوكسى تيترا سيكلين

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الملخص العربى

ينتشر نبات السريس فى كثير من البلدان لفائدته التغذوية والعلاجية وتهدف هذه الدراسة الى معرفه تأثير السريس بنسبه (2,5% و 5%) على الكوليستيرول لعدد ثمانية وعشرون من ذكور الجرذان البيضاء ، والتي وضعت على نظام غذائي لمدته اسبوع واحد قبل تقسيمها الى مجموعات . وبعد هذه الفترة قسمت إلى مجموعات رئيسيه متضمنة سبعة فئران فى كل مجموعه وذلك على النحو التالى :

المجموعة (1) المجموعة الضابطة السالبة تغذت على النظام الغذائي الاساسى . المجموعة (2) المجموعة الضابطه الموجبه تغذت على الغذاء الاساسى مع حقن الفئران بالاوكسى تيترا سيكلين (120 جم / كجم العشاء البريتونى) وتم الحقن لمدته ثلاثه ايام متتاليه. واستمرت على النظام الغذائى الأساسى حتى نهاية الدراسة . المجموعه (3) كما فى المجموعه (2) + مسحوق السريس بنسبه 2,5% . المجموعه (4) كما فى المجموعه (2) + مسحوق السريس بنسبه 5% .

فى نهايه فتره التجربه ، تم جمع عينات الدم من الشريان الاورطى لتقدير نسب الدهون فى الدم ، وتقدير وظائف الكبد ، وبالتالي سجلت القياسات البيوكيميائيه والغذائيه والبيولوجيه .

وقد اوضحت النتائج : ان تغذيه الجرذان المصابه بارتفاع الكوليستيرول بالدم على مسحوق السريس بنسب 2,5% و 5% ادت الى تحسين مستويات الدهون فى الدم وكذلك تقليل المخاطر على وظائف الكبد مقارنة بالمجموعه الضابطه الموجبه (التى تم حقنها بالاوكسى تيترا سيكلين) .

الكلمات المفتاحية : الكوليسترول – السريس