

Dill Effect on lipid profile of mice

Suhad A. Ahmed

University of Technology-Applied Science-Biotechnology Branch/Baghdad

Dr.Abbas A. Mohammed

University of Technology-Applied Science-Biotechnology Branch/Baghdad

Sallal A. Abdullah

University of Technology-Applied Science-Biotechnology Branch/Baghdad

Ali H. Saadon

University of Technology-Applied Science-Biotechnology Branch/Baghdad

Received on: 16/5/2012 & Accepted on: 4/10/2012

ABSTRACT

The present study was carried out to determine the effect of methanol extract of *Anethumgraveolens*(Dill) on serum lipoproteins in hypercholesterolaemic mice. A total of 24 male mice (average 25gm body weight) were used in this study. Mice were divided into four groups was injected with 100mg/kg of alloxan to induce hyperglycemic in mice, the first group (1) was used as control (+ve) group (6 mice) which fed on basal diet only and the other three groups fed on basal diet containing 0.5, 1 and 2mg/ml of methanol extract (single daily dose of 1 ml). The experimental feeding period was 21 days. The changes in serum triglyceride (TG), total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C) were measured by using enzymatic kits. However, the HDL-C concentrate decreased relative to control mice. Treatment of hyperlipidaemic mice with dill extract in concentration 1 and 2mg/ml up to 21 days reversed the serum lipid levels compared to mice which were fed basal diet only.

Key words: *Anethumgraveolens*, lipid profile, mice.

تأثير الشبنت على مرتسم الدهون في الفئران

الخلاصة

الدراسة الحالية أجريت لتحديد تأثير المستخلص الميثانولي لنبات الشبنت *Anethumgraveolens* على عملية تمثيل الدهون في مصلل الفئران المصابة hypercholesterolaemic حيث تم استعمال مجموعة من الفئران (24 فأر ذكر) متوسط وزن الجسم 25 غم. وقد قسمت هذه الفئران إلى أربعة مجاميع حيث تم حقنها بمادة 100alloxan ملغم/كغم للحث على زيادة مستوى السكر في الدم. المجموعة الأولى من الفئران تم تغذيتها على الغذاء العادي فقط في حين المجاميع الثلاثة المتبقية تغذت على الغذاء العادي إضافة إلى 0.5 ، 1 و 2 ملغم/مل من المستخلص الميثانولي لنبات الشبنت بمعدل جرعة واحدة يوميا وبمقدار 1مل لكل تركيز ولمدة 21 يوميا. تم قياس التغيرات في الدهون الثلاثية في الدم (TG) ، الكولسترول الكلي (TC) ، الكثافة العالية للكوليسترول (HDL-C) والكثافة المنخفضة

للكوليسترول (LDL-C). لوحظ انخفاض مستويات HDL-C للفئران المجرعة بالتركيز 1 و 2 ملغم/مل بعد 21 يوما مقارنة مع الفئران غير المجرعة (مجموعة السيطرة).

INTRODUCTION

Herbal medicines have been the main source of primary health care in many nations. About 80% of the world's populations are still dependent on traditional medicines. Medicinal plants which form the backbone of traditional medicine, have in the last few decades been the subject for very intense pharmacological studies this has been brought about by the acknowledgement of the value of medicinal plants as potential sources of lead compounds in the drug development [1]. Many plant extracts have been shown to have hypocholesterolemic activity in rats and the effects of several extracts have been described [2-5]. *Anethum graveolens* L. (Umbelliferae), known as dill, is an annual herb growing in the Mediterranean region, Europe, central, southern Asia and it is widely cultured in south eastern region of Iran and Iraq. The generic name "Anethum" is derived from the Greek word "anethon" and the common name dill comes from the Old Norse word, *dylla* or *dilla* which probably means "to soothe" [6]. The plant is used both medicinally and as an aromatic herb and spice and cookery [7]. Dill has been used traditionally for gastrointestinal ailments such as flatulence, indigestion, stomachache colic and to tract intestinal gas [8]. The presence of flavonoids, phenolic compounds and essential oil in *Anethum graveolens* has been reported [9]. Some pharmacological effects of the plant such as antimicrobial [10], antispasmodic, anti secretory and mucosal protective effects have also been reported [11]. The anti-hypercholesterolaemic and anti-hyperlipidaemic activities (TC, TG) of the crude extract have previously been reported [12]. Cardiovascular disease, currently the leading cause of death and illness in developed countries, will soon become the pre-eminent health problem worldwide [13]. Atherosclerosis, a progressive disease characterized by the accumulation of cholesterol, low density lipoprotein-cholesterol (LDL-C) and fibrous elements in the large arteries, constitutes the single most important contributor to this growing burden of cardiovascular disease [14]. Elevated levels of plasma total cholesterol (TC) and triglycerides (TG) have been implicated as causative factors in development of atherosclerosis and coronary heart diseases (CHD). Efforts to develop effective and better hypolipidaemic drugs have led to the discovery of natural agents [15]. Research in herbal medicine has increased in the world as an alternative solution to health problems so the aim of present study was to determine the effects of the *Anethum graveolens* extract on serum lipoproteins profile in hypercholesterolaemic mice.

SUBJECTS AND METHOD

Extraction of Plant

A methanolic extract of *Anethum graveolens* (Dill) was prepared from a whole plant (leaves and stems) were procured from the local market. The dried plant was milled then the powder was extracted with methanol at 60°C for 6 hours. The extract was filtered, concentrated and dried at 50°C in oven. Extract was then prepared to 0.5, 1 and 2 mg/ml by using sterilized distilled water [16].

Animals

Male mice weighing 25g were allocated in groups (5). The animal had free access to water and normal diet. The study lasted for 3 weeks. the mice were randomly divided into four groups each of 6 animals injected with 100mg/kg of alloxan to induce hyperglycemic in mice as follows: Group 1: received normal diet Group 2: received normal diet+ Anethumgraveolensextract(0.5mg/ml), Group 3: received normal diet+ Anethumgraveolensextract(1mg/ml), Group 4: received normal diet+ Anethumgraveolensextract(2mg/ml), At time intervals of 21 days. the overnight fasted mice were anesthetized with diethyl ether and their blood samples were collected by cardiac puncture into glass tubes and centrifuged at 3000 rpm, 4°C for 15 min.

Biochemical analysis

TG, TC, HDL-C and LDL-C in serum were determined using enzymatic kits.

Statistical analysis

All values were expressed as mean \pm S.D. The significance of differences between the means of the treated and untreated groups were calculated by unpaired Student's t-test and $P < 0.05$ was considered [17].

Results and Discussion

Effects of Anethum graveolens extract (AGE) on lipid Parameters Statistical evaluation of mice serum lipid levels. Administration of AGE (at a single daily dose of 2 ml to mice for 14 consecutive days reduced the levels of TC, TG and LDL-C compared to mice which were fed basal diet only as shown in Table one.

Table (1) Effect of Anethumgraveolensextract on lipid profile of mice.

Groups	Cholesterol (mg/dl) M \pm SD	Triglyceride (mg/dl) M \pm SD	HDL-C (mg/dl) M \pm SD	LDL-C (mg/dl) M \pm SD	VLDL (mg/dl) M \pm SD
Control	190.65 \pm 3.12	106.03 \pm 4.73	47.66 \pm 0.86	121.78 \pm 1.43	21.21 \pm 0.94
AGE(0.5mg/ml)	158.08 \pm 4.99**	93.65 \pm 3.71	39.52 \pm 1.25**	100.02 \pm 4.68**	18.73 \pm 0.75
AGE (1mg/ml)	153.26 \pm 8.17*	84.08 \pm 1.03***	34.94 \pm 0.84***	88.01 \pm 2.70***	16.82 \pm 0.21***
AGE(2mg/ml)	136.03 \pm 3.02***	82.61 \pm 2.61*	34.01 \pm 0.76***	85.5 \pm 1.74***	16.52 \pm 0.52*

M=mean SE=standard error

*p<0.05 **p<0.025 ***p<0.01

Anethum graveolens has been reported to have a variety of biological effects including anti microbial, anti secretory, mucosal protective and hypolipidaemic activity. For the hypolipidaemic effects, scientific data on its efficacy is scarce. In this study, who examined whether the AGE is capable to improve the lipoprotein profile in mice. It has been reported that hyperlipidaemia (increased level of TG, TC and LDL-C) is an important risk factor for development and progression of CHD [18].

In this study, administration of AGE to hyperlipidaemic mice significantly lowered serum TG, TC and LDL levels except in 0.5mg/ml concentration which show non significant. Epidemiological studies have also shown that high HDL levels could potentially contribute to anti-atherogenesis, including inhibition of LDL-oxidation to protect the endothelial cells from the cytotoxic effects of oxidized LDL [19]. In addition, LDL/HDL ratio has direct correlation with the incidence of cardiovascular diseases. A logical therapeutic strategy to prevent or treat atherosclerosis and reduce the incidence of CHD events is to target the hyperlipidaemia by diet/or lipid-lowering drugs. Phytochemicals, especially the phenolic compounds and flavonoids of fruits and vegetables, have been proposed as the major bioactive compounds which provide the health benefits in diets which are rich in plant-foods. Several clinical trials have documented beneficial modifications of the LDL/HDL ratio after intake of flavonoid-containing food products. Yazdanparast and Bahramikia [20] have reported that flavonoids intake decreased LDL and increased HDL in hypercholesterolaemic individuals. Independent studies have confirmed the presence of phenolic compounds mainly flavonoids in *A. graveolens* [21]. Considering these facts, it may be possible that these active principles are responsible for lowering TC and LDL and HDL in group 2 and 3 mice. The possible underlying mechanism by which AGE can exert its lipid lowering activities is not completely elucidated. At the moment, several fundamental mechanisms have been proposed. A decrease in cholesterol absorption from the intestine, through binding to bile acids and an increase in faecales bile acids excretion, has been considered as the mechanism of action of *Momordica charantia* [22]. The same mechanism might be behind the mode of action of *A. graveolens* leaves extract in decreasing the TC level among the treated mice. In addition, the observed hypotriglyceridemic effect might be due to a decrease in fatty acids synthesis [23].

REFERENCES

- [1]. Linda, C.; Hemphill, L.; Lynne, C.; David, R.; Michael, F.; Craig, S.; Steven, R.; Jennifer, B.; Peter, M.; Peter, G.; Virginia, A. and Karen, E. Health benefits of herbs and spices: The past, the present, the future. *M. J. A.* 185:S1-S24. (2006).
- [2]. Zhang, Z.; Ho, W.K.; Huang, Y.; James, A.E.; Lam, L.W. and Chen, Z.Y. Hawthorn fruit is hypolipidaemic in rabbits fed a high cholesterol diet. *J Nutr.* 132:5–10. (2002)
- [3]. Yousef, M.I. Reproductive performance, blood testosterone, lipid peroxidation and seminal plasma biochemistry of rabbits as affected by feeding *Acacia saligna* under subtropical conditions. *Food Chem Toxicol*; 43:333–9. (2005)
- [4]. Vasu, V.T.; Modi, H.; Thaikoottathil, J.V. and Gupta, S. Hypolipidaemic and antioxidant effect of *Enicostemma littorale* Blume aqueous extract in cholesterol fed rats. *J Ethnopharmacol*; 101:277–82. (2005)
- [5]. Bahramikia, S. and Yazdanparast, R. Effect of hydroalcoholic extracts of *Nasturtium officinale* leaves on lipid profile in high-fat diet rats. *J Ethnopharmacol*; 115:116–1217. (2008).
- [6]. Ishikawa, T.; Kudo, M. and Kitajima, J. Water-soluble constituents of Dill. *Chem Pharm Bull*; 50:501–507. (2002)
- [7]. Wahba, N.M.; Ahmed, A.S. and Ebraheim, Z.Z. Antimicrobial effects of pepper, parsley, and dill and their roles in the microbiological quality enhancement of traditional Egyptian Kareish cheese. *Foodborne Pathog Dis.* 7(4):411-8. (2010)

- [8]. Hosseinzadeh, H.; Karimi, GR. and Ameri, M. Effects of *Anethum graveolens* L. Seed extracts on experimental gastric irritation models in mice. *BMC Pharmacol* 2: 1–5. (2002)
- [9]. Justesen, U. and Knuthsen, P. Composition of flavonoids in fresh herbs and calculation of flavonoid intake by use of herbs in traditional Danish dishes. *Food Chem.* 73:245–250. (2001).
- [10]. Abed, K.F. Antimicrobial activity of essential oils of some medicinal plants from Saudi Arabia. *Saudi J. Biol. Sci.* 14:53-60. (2007).
- [11]. Gurinder, J.K. and Daljit, S.A. Bioactive potential of *Anethum graveolens*, *Foeniculum vulgare* and *Trachyspermum ammi* belonging to the family Umbelliferae - Current status *Journal of Medicinal Plants Research* Vol. 4(2), pp. 087-094, 18 January, 2010.
- [12]. Hajhashemi, V. and Abbasi, N. Hypolipidemic activity of *Anethum graveolens* in rats, Isfahan Pharmaceutical Sciences Research Center, Isfahan University of Medical Sciences, Isfahan, I. R. Iran. 22(3): 372-375. (2008).
- [13]. Parsaee, H.; Shafei, MN. and Boskabady, MH. Effects of hydro-ethanolic extract of *berberis vulgaris* fruit on rabbit isolated heart. *DARU*; 14(4): 208-213. (2006)
- [14]. AL-Blooni, I. A. M. Some herbs reduce the height of blood sugar, blood cholesterol in alloxan- diabetic rats. *Acad. J. biolog. Sci.*, 2 (2): 27- 32. (2010)
- [15]. El-Maghraby, S.I.; Hamdy, A. T. and Nabila, S. H. Effect of *Anethum Graveolens* L. Extract on Biochemical and Histopathological Alteration of Deltamethrin in Rats *J Bioanal Biomed* 2: 008-012. doi: 10.4172/1948-593X.1000014. (2010)
- [16]. Amin, W.M.A. and Sleem, A.A. Chemical and biological study of aerial parts of dill (*Anethum graveolens*). *J. Biomed. Sci.* Vol. 23, March, 2007.
- [17]. Snedecor, G.W. and Cochran, W.G. In *Statistical Methods*, 7th Edition, Iowa State University Press, Ames, USA, Page 90-92. (1986).
- [18]. Assmann, G. and Nofer, J. Atheroprotective effects of high-density lipoproteins. *Annu Rev Med*; 54:321–341. 2003
- [19]. Harrison, D.; Kathy, KG.; Hornig, B. and Drexler, H. Role of oxidative stress in atherosclerosis. *Am J Neuroradiol*; 91:7A–11A. 2003.
- [20]. Yazdanparast, R. and Bahramikia, S. Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats *DARU* Vol. 16, No. 2. 2008
- [21]. Heamalatha, S.; Swarnalatha, S.; Divya, M.; Gandhi, LR.; Ganga, DA and Gomathi, E. Pharmacognostical, Pharmacological, Investigation on *Anethum Graveolens*. *RJPBCS* Volume 2 Issue 4 Page No. 564- 574. 2011.
- [22]. Senanayake, GV.; Maruyama, M.; Sakono, M.; Fukuda, N.; Morishita, T.; Yukizaki, C.; Kawano, M. and Ohta, H. The effects of bitter melon (*Momordica charantia*) extracts on serum and liver lipid parameters in hamsters fed cholesterol-free and cholesterol-enriched diets. *J Nutr Sci Vitaminol (Tokyo)* 50:4253–7. 2004.
- [23]. Bahramikia, S. and Yazdanparast, R. Efficacy of different fractions of *Anethum graveolens* leaves on serum lipoproteins and serum and liver oxidative status in experimentally induced hypercholesterolaemic rat models. *Am. J. Chinese Med.* 37: 685-699. (2009).