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تأثير مستخلص الثوم في مستويات الدهون في الجرذان

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Summary:

The effect of garlic (*Allium sativum*) on lipid profile in normal and hyperlipidemic rats was studied. Forty rats were allocated randomly into four groups, each of ten rats. The first group was received distilled water as acts as a control group. The second and the third group were given high cholesterol diet (2% cholesterol) for 4 weeks, one considered as a hypercholesterolemic group and the other was hypercholesterolemic which received alcoholic extract of garlic at a dose of 300mg/kg B.W for 4 weeks. The fourth group was given alcoholic extract of garlic at the same dose and the same duration. The serum lipid profile of the experimental animals in all groups was assayed and the resulting values statistically analyzed.

The values of total cholesterol (Tch), Triglyceride (TG) and low density lipoprotein (LDL) were significantly decrease in groups received garlic extract comparing with control and hypercholesterolemic groups with non significant increase in high density lipoprotein (HDL) in all groups.

Garlic may be recommended as an anti atherogenic agent and is suggested to be used with food in patient with hyperlipidemia.

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الخلاصة:-

درس تأثير الثوم في مستويات الدهون في الجرذان طبيعية التغذية والجرذان ذات التغذية عالية الكوليسترول. وزرعت أربعون جرذاً بصورة عشوائية في أربع مجموعات احتوت كل منها ١٠ جرذان وكالاتي: المجموعة الأولى التي أعطيت الغذاء الطبيعي وجرعت بالماء المقطر واعتبرت مجموعة سيطرة، المجموعة الثانية والثالثة والتي أعطيت عليقة غنية بالكوليسترول (٢٪) لمدة أربع أسابيع حيث اعتبرت المجموعة الثانية المجموعة العالية الكوليسترول ولم تجرع بمستخلص الثوم في حين اعتبرت المجموعة الثالثة المجموعة عالية الكوليسترول وجرعت بمستخلص الثوم بجرعة مقدارها ٣٠٠ ملغم/كغم من وزن الجسم لأربعة أسابيع، أما المجموعة الرابعة فقد أعطيت العليقة الاعتيادية وجرعت بمستخلص الثوم بنفس الجرعة والفترة الزمنية ذاتها. أخضعت مستويات الشحوم في جميع الحيوانات المختبرية للمجاميع كافة للتحليل الكيماوي وحلت النتائج إحصائياً. أظهرت النتائج انخفاض معنوي في مستويات الكوليسترول الكلي، الكليسرول الثلاثي والبروتين الشحمي واطى الكثافة في المجموعتين اللتان جرعتا بمستخلص الثوم المائي مقارنة بمجموعة السيطرة والمجموعة التي غذيت بمستوى عالي من الكوليسترول مع زيادة غير متوقعة في البروتين الشحمي عالي الكثافة في المجاميع كافة مقترنة بمجموعة السيطرة. يمكن التوصية ومن خلال نتائج هذه الدراسة باعتبار مستخلص الثوم الكحولي كعامل مضاد لتصلب الشرايين مع إمكانية استخدامه في غذاء المرضى الذين يعانون من ارتفاع مستوى الشحوم في الدم.

Introduction:

Atherosclerosis is the principal contributor to the pathogenesis of myocardial and cerebral infarction. Elevated plasma concentration of cholesterol, especially in LDL, is recognized as leading to the atherosclerosis [1].

Garlic (*Allium sativum*) belongs the plant Lily family which is a genus of 500 species. It has been grown a round the world for the flavoring cooking. The potency of garlic has been as knowledge for 7500 years. In ancient times, the Babylonian, Egyptian, Chinese, Greeks, and Hinds used garlic frequently [2]. Interest in the potential benefits of garlic has origins in antiquity and is one of the earliest documented example of plant used for maintenance of health and treatment of diseases [3]. It is possesses many healthful properties that are related to its bioactive compounds [4]. It widely used as an all-around treatment for prevention or slowing the progression of atherosclerosis [5].

More recently, attention has been focused an garlic 's ability to decrease blood cholesterol level in clinical trials in humans [6], as well as in experimental studies with animals [7].

The present study was carried out to investigate the effect of alcoholic extract of garlic on lipid profile in experimental rats.

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Garlic bulbs were purchased directly from local market. It is fully grinded by blender, the grinded garlic was put in light polyethylene bags and placed in freezer at $-20\text{ }^{\circ}\text{C}$ until used.

2. Animals:

Forty fertile male albino rats weighting approximately 200 – 210 gm body weight were obtained from animal house of physiology department in veterinary medicine, university of Baghdad. They kept under good ventilation with 12 house light and dark cycle. Experimental hyper cholesterolemic animals were fed a cholesterol – enriched high fat diet for four weeks. They were arranged into four groups (10 rats per group) as follow:-

- Garlic group : was administered garlic extract at a dose of 300mg/kg B.W. with gastric tube for four weeks.
- Hyper cholesterolemic group : fed a cholesterol – enriched fat diet for four weeks.
- Garlic and hyper cholesterolemic group : was administered garlic extract at a dose at 300 mg/kg B.W. and fed a cholesterol – enriched fat diet for four weeks.
- Control group : fed adlibitum on standard diet with distilled water.

The methods**1. Extraction by ethanol 95% :**

To 18 gm of dry plant powder, 150ml oh ethyl alcohol 95% was added, left on magnatic starrier for 1 hours the whole mixture was filtered first by medical gauze followed by centrifugation at 3000 rpm/min for 15 seconds supernatant was collected and put in earthen bowl to dryness by oven at $40\text{ }^{\circ}\text{C}$, the crude extract was kept at $-20\text{ }^{\circ}\text{C}$ until use [8].

2. Preparation of alcoholic extract :

Three grams was weighted from primary crude extract by ethanol and dissolved in 10 ml of ethanol to prepare (300mg/ml), this concentration were put on vertex for 10 second, sterilize by Millipore filter (0.22hm), then put in sterile tubes for use.

3. Biochemical assessment :

The blood was collected in non heparinized tube from rats in each group, and centrifuged at 3000 rpm/min and the serum was collected. Serum levels of total cholesterol, triglyceride and HDL were determining according to [9] ,[10] and [11]. LDL was calculated from the total cholesterol [12].

Results

The serum lipid lowering effect of alcoholic extract of garlic in albino rats is presented in table (1). The mean total cholesterol, LDL and triglyceride levels were significantly decreased.

There is no significant differences in HDL levels of the different groups.

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Hadeel Ahmad Hassan

Table(1) : The effect of aqueous extract of garlic on lipid profile in rats.

Groups	Total cholesterol mg/dl	Total triglyceride (mg/dl)	HDL (mg/dl)	LDL mg/dl
Control	74.2 ± 3.5	45.03 ± 5.1	52.7 ± 1.5	22.9 ± 2.2
Hypercholesterol	132*.7 ± 2.0	81*.5 ± 3.	45.4 ± 2.5	71*.2 ± 4.4
Garlic	68*.1 ± 1.3	33*.2 ± 1	57.2 ± 2.1	18*.3 ± 1.2
Hypercholesterolemic + Garlic	90*.5 ± 2.4	42.0 ± 1	50.4 ± 3.1	20.4 ± 1

-Data were expressed as mean ± SE (n=10) by applying one way ANOVA and determined F test.

* The data significant at (P< 0.05)

Discussion

Hypercholesterolemia is an autosomal dominant disorder that cause sever elevations in total cholesterol which enhanced the development programming of atherosclerosis [13].

The most studied are reported health promoting effect of garlic is cardio protection [14]. However some authors claim that garlic is not effective in plasma lipid lowering and the use of garlic for treatment of hypercholesterolemia is of questionable value [15]. Other publications [16] , [17] suggested that not all preparations may be hypocholesterolemic which have caused confusion within both public and academic domains.

Although the reason for these inconsistencies remain unknown, it likely relates to preparation methods, stability and quantity of compounds occurring in the preparations quantity of the preparation provided and for the duration the study.

The cholesterol lowering action of garlic may be attribute to in part to depressed cholesterol synthesis by the liver. The triglyceride lowering effect of garlic might be explained in part by its inhibitory action of fatty acid synthesis. Furthermore there are several explanation for the result were obtained. The mechanism for cholesterol lowering effect of garlic has also been attributed to inhibition of specific activity of enzyme HMG-CoA reductase a rate- limiting enzyme in cholesterol biosynthesis. This enzyme has been reported to be significantly lowered in rat liver microcosms after garlic consumption [18]. The protective effects of garlic may be attributed to inhibition of enzymes involved in lipid synthesis, prevent lipid peroxidation and LDL increased antioxidant, these mechanism are however open to further studies [19].

Garlic decrease S.T.C And S.T.G in hyperlipidemic- garlic received rats compared with hyperlipidemic control, it is suggested that this effect may be due to action of allyl cystine And diallyl-disulfide present in garlic oil, these ingredients are potent inhibitor to mono oxygenase enzyme inhibition of this enzyme lead to cholesterol synthesis inhibition [20]. Further more garlic depress the hepatic activities of lipogenic and cholesterogenic enzyme, (Malic enzyme) and HMG- CoA reductase which is provide a possible explanation for reduction effect of garlic on S.TG [21], and the reduction in LDL may be due to the suppression of LDL oxidation [22].

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It can be concluded that the garlic used as antiathrogenic agent by reducing the S.T.C. and S.TG and LDL.

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Hadeel Ahmad Hassan

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