

Effect of Atorvastatin And Garlic on Lipid Profile in Hyperlipidemic Patients

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Abstract

Background: Hyperlipidemia is one of the most common diseases among Iraqi community, and using herbal medicine in treating hyperlipidemia was a good choice to reduce the side effect of recommended drugs with good results of healing, Garlic (*Allium sativum*) has been used in herbal medicine for centuries for various health problems. It has a beneficial effect of Reducing serum lipids and cardiovascular system disease .The purpose of present study was to evaluate the effects of garlic and atorvastatine on the dyslipidemic people.

Aim: The aim of this study is to assist the affectivity of the garlic in lowering the lipid profile in hyperlipidemic patients as well as the affect of time on treatment.

Methods: This 12 week, Garlic treated, atorvastatin, Garlic + atorvastatin and non treated study was conducted on patients with hyperlipidemia (n=40) were divided into 4 groups each comprising 10 patients, first group was control healthy persons, second group was given garlic capsules (500mg) twice daily, third group was given atorvastatin (40mg-Gulf pharmaceutical), fourth group was given both garlic capsules + atorvastatin.

Results: After 12 week the garlic + atorvastatin treated group had good results in reduction of total cholesterol (5.23 ± 0.12) triglycerides (1.93 ± 0.12) LDL (1.31 ± 0.14) VLDL (0.87 ± 0.15) as compared with those before treatment.

Conclusion: This study suggests that using garlic capsules + atorvastatin in treating dyslipidemia patients are efficiently reduced serum total cholesterol, LDL, VLDL and moderately raised HDL cholesterol as compared with non-treated group ,in addition prolong duration of treatment will assess the benefit effect of garlic + atorvastatin in treatment of dyslipidemia and other cardiovascular system diseases.

Keywords: Dyslipidemia, garlic, atorvastatin, lipid profile.

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Introduction

Dyslipidemia can be defined as the elevation of cholesterol, triglycerides and low density lipoprotein (LDL) cholesterol. serum levels while maintaining low serum levels of high density lipoprotein (HDL)

cholesterol. This imbalance is considered a high-risk factor for inducing atherosclerosis and cardiovascular diseases (CVD) [1].

Lipid lowering drugs used for treating high risk persons include 3 hydroxy -3-methylglutaryl CoA reductase inhibitors



(statins, bile acid binding sequestrants, fibrates and nicotines). None of these pharmacological options are free of adverse effects and some have been associated with potential carcinogenicity. [2]

For centuries, man has used plants for medicinal purpose and over the last few decades, there has been a most remarkable revival of herbal medicine [3].

Garlic (*Allium sativum*) has been used for centuries as an herbal medicine in treating abscesses, cough, poisoning, parasites, worms, digestive and circulatory problems [4]. Garlic was known as an effective material in decreasing blood pressure also can inhibit LDL oxidation [5]. There has been an increasing recognition that certain natural substances have the potential to reduce the detrimental effect of a number of cardiovascular risk factors. The use of natural substances has become more widespread over the past few years driven undoubtedly by the belief that natural substances may have fewer side effects than do pharmaceuticals and by their ready availability to the public without prescriptions or visits to the health centers. Garlic and various forms of extracts prepared from it represent an example of such natural substances that have been claimed to possess beneficial effects for the presentation of various aspects of cardiovascular disease [6]. From above its important to study the lipid lowering effect of garlic on hyperlipidemic patients in Iraq, by using capsules of 1000mg powder of garlic for two different periods of treatments (6,12) weeks. Especially we did not find a study using this concentration.

Method

Serum of 40 subjects were collected and divided into 4 groups and as the followings :-

(10) healthy control, (10) hyperlipidemic patients treated with 500 mg garlic powder capsules (twice daily with meals), (10) hyperlipidemic patients treated with atorvastatin 40 mg, (10) hyperlipidemic patients treated with both garlic capsules and atorvastatin. All these groups are treated for 12 weeks, and the lipid profile parameters was estimated twice, first estimation after 6 weeks while the second estimation after 12 weeks.

Lipid profile parameters were included: total Serum cholesterol (TC), Triglycerides (TG), high density lipoproteins (HDL), Low density lipoproteins (LDL), and very low density lipoproteins (VLDL), and measurement of LDL in blood serum are done according to Friedwald equation:

$$\text{LDL-C} = \text{TC} - \text{VLDL} - \text{HDL}$$

VLDL measurement in blood was done according to Wilson equation:

$$\text{VLDL-Cholesterol (mmol/L)} = (\text{TG} / 2.2)$$

Results

In this study, the group was treated with garlic capsules and atorvastatin showed a clear reduction in lipid profile parameters especially TC, TG, HDL and VLDL, while HDL demonstrated increasing the period in comparison with the value before treatment.

After 6 weeks of treatment with garlic capsules (500 mg/twice daily) TC reduced from 6.83 ± 0.02 , TG reduced from 2.86 ± 0.02 to 2.32 ± 0.03 as well as LDL reduced from 4.76 ± 0.64 to 4.26 ± 0.33 VLDL demonstrate a reduction in its value from 1.30 ± 0.60 to 1.05 ± 0.71 , HDL shown an exception that its level increased from 0.77 ± 0.01 to 0.89 ± 0.01 as shown in table I.

Table(1): Effects of Garlic on serum cholesterol (TC), Tryglycerides (TG), high density lipoproteins (HDL), low density lipoproteins (LDL) and very low density lipoproteins (VLDL) after 6 weeks and 12 weeks of treatment.

| Lipid profile Parameters | Control n=10 | Before treatment | After 6 weeks of treatment | After 12 weeks of treatment |
|--------------------------|--------------|------------------|----------------------------|-----------------------------|
| TC(mmol/L) | 5.57±0.05 | 6.83±0.02 | 6.20±0.02 | 6.05±0.01 |
| TG(mmol/L) | 1.43±0.03 | 2.86±0.02 | 2.32±0.03 | 2.21±0.02 |
| HDL(mmol/L) | 0.02±1.20 | 0.01±0.77 | 0.01 ±0.89 | 1.05±0.08 |
| LDL(mmol/L) | 0.66±3.72 | 4.76±0.64 | 4.26±0.33 | 0.87±4.00 |
| VLDL (mmol/L) | 0.65±0.68 | 1.30±0.60 | 0.71±1.05 | 1.00±0.44 |

*Data represent means ±standard deviation

While after 12 weeks of treatment with garlic capsules all lipid profile factors shown reduction in their value except HDL.

For TC reduced from 6.20±0.02 to 6.05±0.01, TG reduced from 2.32±0.03 to 2.21±0.02, LDL reduced from 4.26±0.33 to 4.00±0.87 and VLDL reduced from 0.71±1.05 to 1.00±0.44 as shown in table I.

In opposite to HDL there was raising from 0.89±0.01 to 1.05±0.08.

The results of second group patients those who treated with atorvastatin revealed reduction in lipid profile parameters in both period after 6 and 12 weeks of treatment. For the first period of treatment (6 weeks) TC reduced from 6.93±0.1 to 6.07±0.04 TG

reduced from 2.91±0.35 to 1.21±0.18, LDL reduced from 4.89±0.21 to 4.07±1.75 and VLDL reduced from 1.32±0.35 to 1.00±0.29 as shown in table II. However the results of second period of treatment (12 weeks) TC reduced from 6.07±0.04 to 5.39±0.03, TG reduced from 2.21±0.18 to 1.99±0.17, LDL reduced from 4.07±0.31 to 3.28±1.29 and VLDL reduced also from 1.00±0.29 to 0.90±0.22.

HDL parameter for both period of treatment demonstrated increased value from 0.72±0.01 to 1.00±0.01 after 6 weeks and from 1.00±0.01 to 1.21±0.03 after 12 weeks of treatment as shown in table II.

Table (2): Effects of atorvastatin on serum cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoproteins (LDL), very low density lipoproteins (VLDL) after 6 and 12 weeks of treatment.

| Lipid profile Parameters | Control n=10 | Before treatment | After 6 weeks of treatment | After 12 weeks of treatment |
|--------------------------|--------------|------------------|----------------------------|-----------------------------|
| TC(mmol/L) | 5.57±0.05 | 6.93±0.10 | 6.07±0.04 | 5.39±0.03 |
| TG(mmol/L) | 1.43±0.03 | 0.35±2.91 | 2.21±0.18 | 0.17±1.99 |
| HDL(mmol/L) | 0.02±1.20 | 0.72±0.01 | 1.00±0.01 | 1.21±0.03 |
| LDL(mmol/L) | 0.66±3.72 | 4.89±0.21 | 4.07±0.31 | 3.28±1.29 |
| VLDL (mmol/L) | 0.65±0.68 | 1.32±0.35 | 1.00±0.29 | 0.90±0.22 |

*Data represent means ±standard deviation

Third group of patients treated with (garlic capsules and atorvastatin) demonstrated a significant reduction in lipid profile parameters differ from previous two

tables or two treatment groups the up taking of both (garlic capsules and atorvastatin) produced good or an efficient results in reducing lipid profile parameters.



The results of 6 weeks of treatment shown that TC reduced from 6.89 ± 1.06 to 5.93 ± 0.11 , TG reduced from 2.89 ± 0.18 to 2.09 ± 0.17 , LDL reduced from 4.88 ± 2.02 to 3.82 ± 1.81 and VLDL from 1.31 ± 0.22 to 0.95 ± 0.21 .

While those who were treated for 12 weeks, TC reduced from 5.93 ± 0.11 to 5.23 ± 0.12 , TG reduced from 2.09 ± 0.17 to

1.93 ± 0.12 , LDL reduced from 3.82 ± 1.81 to 3.05 ± 1.43 and VLDL from 0.95 ± 0.21 to 0.87 ± 0.15 . But, HDL recorded increasing for both period of treatment, from 0.7 ± 0.08 to 1.16 ± 0.09 for 6 weeks of treatment, and from 1.16 ± 0.09 to 1.31 ± 0.14 for 12 weeks of treatment as shown in table III.

Table (3): Effects of (Garlic and atorvastatin) on serum cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoproteins (LDL), very low density lipoproteins (VLDL) after 6 and 12 weeks of treatment.

| Lipid profile Parameters | Control n=1 | Before treatment n=10 | After 6 weeks of treatment n=10 | After 12 weeks of treatment n=10 |
|--------------------------|-----------------|-----------------------|---------------------------------|----------------------------------|
| TC(mmol/L) | 5.57 ± 0.05 | 6.89 ± 1.06 | 5.93 ± 0.11 | 5.23 ± 0.12 |
| TG(mmol/L) | 1.43 ± 0.03 | 2.89 ± 0.18 | 2.09 ± 0.17 | 1.39 ± 0.12 |
| HDL(mmol/L) | 0.02 ± 1.20 | 0.70 ± 0.08 | 1.16 ± 0.09 | 0.14 ± 1.31 |
| LDL(mmol/L) | 0.66 ± 3.72 | 4.88 ± 0.02 | 1.81 ± 3.82 | 3.05 ± 1.43 |
| VLDL (mmol/L) | 0.65 ± 0.68 | 1.31 ± 0.22 | 0.21 ± 0.95 | 1.50 ± 0.87 |

*Data represent means \pm standard deviation

Discussion

The effect of garlic was evaluated on hyper lipidemic patients with lipid profile parameters. In this study treatment with garlic capsules significantly affected lipid levels in serum.

The onset of hypolipidemic effects were evident as early as 6 weeks and become more progressive and greater after 12 weeks, the enhancement effect of garlic with atorvastatin is clearly demonstrated in table (III) in lowering the lipid profile parameters after 12 weeks of treatment.

The results of this study is in good agreement with Tohidi *et al* showed that taking 1200 mg garlic powder for 4 weeks reduced total cholesterol TC (9 %), TG (11%)and LDL (15%) [7]. And agree with Saw *et al* which they found that garlic has a synergistic /additives effect with anti diabetic medications [8], contrary to Isaacsouh *et al*,

have observed no change in serum cholesterol levels in patients with hypercholesterolemia after 12 weeks of treatment with garlic powder 900 mg/day [4]. While significant reduction in total cholesterol and LDL-C as well as moderate increase in HDL-C was observed in our study.

Adler and Holub showed that LDL were (14.2%) and total cholesterol was significantly lower (11.5%) with taking 900 mg garlic /day for 12 weeks in hypercholesterolemic men [9]. Steiner *et al* giving (7.2 g) aged garlic extract (AGE) for 4 weeks indicated reduction in cholesterol (6.1%), LDL (4%) [10]. Lash *et al* reported that taking garlic tablets at a dose of 680 mg two times a day for 6 & 12 weeks decreased LDL (6%) and total cholesterol (4%) significantly in hypercholesterolemic patient [11].



Increasing of HDL cholesterol as shown in table (I,II,III) is agree with [1], [7] and [12] this may be attributed to concentration of garlic .Its obvious that its inhibitory effect is concentration dependant in addition to inhibiting intestinal cholesterol absorption and enhancing cholesterol turnover to bile acids. The effectiveness of garlic in lowering the hyperlipidemia attributed to the substance called Allicin [13]. which cause inhibition to the enzyme HMG-CoA reductase [6] and thus inhibit hepatic cholesterol biosynthesis[14]

Other study suggests that one particular thiosulfinate-allicin-is the active element in garlic responsible for its numerous medicinal properties particularly its reduction effect on LDL-cholesterol [15].

Conclusion

Garlic capsules were efficiently lowering blood cholesterol in both periods of treatment. The result will be better when its taking in combination with atorvastatin which refer to the advantage of using dual therapy in treating the hyperlipidemic patients. Time factor plays a great role in lowering blood cholesterol 12 weeks produced best results that 6 weeks of treatment.

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