

RESEARCH ARTICLE

The Therapeutic Effect of Some Drugs and Vegetable Juices on the Lipid Profiles in Male Rabbits induced Atherosclerosis

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ABSTRACT

This study was designed to test the therapeutic efficacy of some hypotensive drugs and vegetable drinks on some biochemical indicators in male rabbits, where atherosclerosis was developed using 1% cholesterol with food. This study was conducted in June until the end of July 2017 in the Pharmacology Department/General Company for Pharmaceutical Industry in Samarra. In the study, 50 local rabbits were randomly distributed by 10 groups, each containing five animals. The first group considered as the control group. The second group is the control group treated with 1% cholesterol with the food, the third group treated with cholesterol (1% and captopril 0.71 mg), group 4 (cholesterol 1% with atenolol 0.71 mg/kg), group 5 (cholesterol 1%, amlodipine 0.07 mg/kg), group 6 treated with cholesterol 1% and aldomet (0.57 mg/kg), group 7 (cholesterol 1% and furosemide at 3.5 mg/kg), group 8 (cholesterol 1% with garlic syrup 2 mL), group 9 treatment cholesterol 1% and lemon juice), and group 10 Treatment with (1% cholesterol and green tea syrup 2 mL). The results of the study showed a significant increase ($p \leq 0.01$) at the level of each of cholesterol triple and triglycerides, proteins and low density lipoproteins, very low density lipoproteins, also led to obtain a significant decrease in the level of high-density lipoproteins (HDL) in the treatment group with cholesterol 1% compared to control group. At the time of the treatment of anti-pressure drugs: Captopril, Atenolol, Amlodipine, Aldomet, and Furosemide, there were no significant differences in the cholesterol level of all pharmacological groups. Moral differences were not found in LDL-C, and there was a significant decrease ($p \leq 0.01$) of the level of triglycerides, proteins, and very low-density lipoproteins, and there was a significant increase in the level of high-density lipoproteins HDL-C, while treatment with plant juices, there was a significant decrease ($p \leq 0.01$) in the level of total cholesterol and triglycerides and LDL, and VLDL, high-density lipoprotein (HDL-C) increased when treated with garlic, lemon, and green tea. We conclude pressure drugs of any kind can cure atherosclerosis or prevent high fat, unlike its counterparts of plants, which have shown a significant effect on controlling lipid profile and reducing their effects and future risks on the heart.

Keywords: Drugs; Therapeutic Effect; Lipid profiles

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INTRODUCTION

Vascular disease is one of the most common diseases and causes of death in the world. As most studies indicate that the future death rate of cardiovascular disease to 32.6 million cases by 2030,¹ the difference in heart disease that affects the heart muscle and its vascularity, making it a serious disease, if the heart disease is caused by various factors, including the hereditary component, which is an acquired factor, and the oxidative damage is one of the major pathogens leading to various coronary heart diseases.^{2,3} Blood pressure (BP) and atherosclerosis are major problems that lead to future

problems in the body and often lead to premature death. Scientists have developed many drugs that help reduce heart disease and coronary artery disease such as statins and low BP drugs, each of which On a special type of body areas for examples amlodipine, aldomet and fursimed captopril, atenolol. It is a widely used drug for the elimination of diseases of BP has also increased recently in return to natural compounds and food that contains many effective compounds that will reduce the incidence of the disease and these plants are garlic, lemon and green tea, which proved effective in reduce the disease.

MATERIALS AND METHODS

The animals used in this study were local male rabbits (processed from the pharmacological department - the general company for the pharmaceutical industry in Samarra. numbered 50, and the weight ranged between 1000 and 1250 g and were placed in special cages and supplied with water and their own processed food from Department of Pharmacology-General Company for the manufacture of medicines in Samarra during the trial period.

Induced of atherosclerosis

Using the standardized standard meal after the addition of cholesterol powder processed by BDH, adding 1 g of cholesterol to each kg of ready-made rice.

Design of experimentation

- Group 1: the control group negative control group
This group was treated with a standard diet and normal drinking water daily for 42 days until the experiment was completed.
- The group of cholesterol-induced atherosclerosis as positive control
This group was treated with a standard diet of 1% cholesterol and normal drinking water daily for 42 days until the experiment was completed.
- the group of hardened arteries induced + drug captopril (ch + cap)
This group was treated with a standard diet, and 42 days after induction of sclerosis was treated with captopril (0.7 mg/kg bw) orally until the experiment was completed.
- The induced atherosclerotic group + the drug ethylene (ch + Ate)
This group was treated with a standard diet and 42 days after the induction of atherosclerosis was injected with ethanol (0.7 mg/kg bw) orally until the experiment was completed
- the group of induced atherosclerosis + the amlpodipine drug (Ch + Amil)
This group was treated with a standard diet and after 42 days of induction of atherosclerosis, it was injected with molybdenum (0.07 mg/kg bw) orally until the experiment was completed
- 6: Induced atherosclerotic group + drug aldomet (ch + Aldo)
This group was treated with a standard diet and 42 days after the induction of MS; it was injected with the aldomet (3.5 mg/kg bw) orally until the experiment was completed
- Induced atherosclerotic group + Frusemide (Ch + Fru)
This group was treated with a standard diet, and 42 weeks after induction of atherosclerosis was injected with oral Frusemide (0.5/kg bw). Until the end of the experiment
- induced atherosclerosis group + garlic extract (Ch + *Allium sativium*)
This group was treated with a standard diet and 42 days after the induction of atherosclerosis was injected with garlic extract (2 mL/kg body weight) orally until the end of the experiment

- Induced Atherosclerosis group + lemonade syrup (Ch + *Citrus lemon*)
This group was treated with a standard diet, and 42 days after the induction of atherosclerosis was injected with lemon juice (2 mL/kg body weight) orally until the end of the experiment.
- Induced atherosclerotic group + green tea syrup (Ch + *Comellia sinensis*).
This group was treated with a standard diet and 42 days after the induction of atherosclerosis, treated with the green tea syrup (2 mL/kg body weight) orally until the experiment was completed.

Blood samples

After the trial period, blood samples were obtained by killing animals and collecting blood samples from the heart to obtain as much blood as possible. Then the blood was placed in test tubes free of anticoagulant and serum separation by the centrifugal device at 3000 cycles/minute for 15 minutes and, keeping the serum at -20°C until the measurement of the biochemical indicators.

Biochemical tests:

The measurement of biochemical parameters done by ready kits, according to the indication of these kits. Biolabo analysis has been used to conduct biochemical analyzes of cholesterol and triglycerides. High-density lipoproteins of cholesterol and VLDL were calculated using equation $VLDL-C = TG/5$, whereas low-density lipoproteins were calculated using the following equation:

$$LDL-C = TC - (HDL-C + VLDL-C)$$

Results and Discussion:

The results indicated in Figure 1 that there was a significant increase of $p \leq 0.01$ in the concentration of cholesterol in a group treated with cholesterol 1 g/kg compared to the control group. The results showed a significant decrease ($p \leq 0.01$) in the cholesterol and captopril group, cholesterol and garlic group, cholesterol and lemon group, and cholesterol group and green tea, compared to the control group, which treated with 1% cholesterol. While there was no significant change in cholesterol and ethanol group, cholesterol and amlodipine group, cholesterol, and Frusemide compared to control-treated with 1% cholesterol.

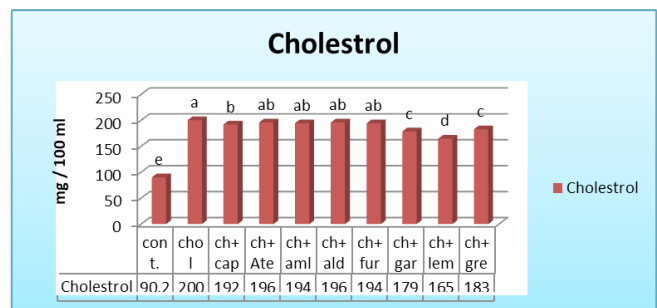


Figure 1: Effect of the treatment of captopril, atenolol, amlodipine, aldomet, furosamide, and garlic, lemon, and green tea syrup in the concentration of cholesterol (mg/100 mL) for the treatment group with induced atherosclerosis.

The results were consistent with the results of Figure 4 and 5. The results showed a significant increase in the cholesterol level of the cholesterol-treated rabbits compared with the control. The results of the statistical analysis showed a mean of the control group (108.30 + 7.69 mg/100 mL) The main reason may be due to oxidative stress, which caused an imbalance of lipid fat due to peroxidation and stenosis, which led to inhibition of lipid secretion and its production of steroid and in turn the most recent defect in the processes of digestion and absorption of fat,⁶ refers to That atherosclerosis caused by the accumulation of cholesterol in the arteries leads to “lack of blood supply of organs, which leads to the development of coronary artery disease (CAD). Stroke, characterized by a high level of blood lipids, especially cholesterol, the current results showed the superiority of the three vegetable juices in reducing cholesterol as well Captopril compared to other low blood pressure medications.

The men of Captopril was (191.75 + 5.11 mg/100 mL) while the mean of atenolol was (196.05 + 5.8 mg/100 mL) and the amlodipine (194.3 +7.92 mg/100 mL), aldomet and frusamid, respectively (195.75 + 5.11 mg/100 mL) (194 ± 0.49 mg 100 mL), but the plants recorded a significant decrease compared to the medicines that did not register any change. The mean of the garlic was 178.57 + 10.31 mg/100 mL, lemons (164.60 + 4.2.2 mg/100 mL), and Green tea (191.92 + 17.80 mg/100 mL). This is due to the antioxidants found in the three plants which reduce the total cholesterol level as well as the role of vitamins such as C in lemon, garlic and which is an antioxidant that helps to dissolve cholesterol through its role in inhibiting

the enzyme hydroxyl methylglutary CoA reductase responsible for building cholesterol.⁷

The treatment with capoten showed a decrease in the level of cholesterol, and this is consistent with,⁸ noting that there is a reduction in the level of cholesterol when given the drug captopril for domestic rabbits and also agrees with aldahham,⁹ and the reason is that the drug captopril contributes to the increase of high-density lipoproteins. Thus, the concentration of cholesterol in the body is reduced, and the increased cholesterol level of the bile also reduces its serum level, or one of the enzymes responsible for making cholesterol has been disabled or inhibited.¹⁰

The results in Figure 2 showed that there were significant differences between the different groups, showing a significant increase in the level of triglycerides in the group treated with cholesterol compared with the control group. On the other hand, the results showed a significant decrease (p <0.01) in all groups treated with medicines and plant juices.

The results of the present study showed a highly significant increase (p ≤ 0.01) at the level of triglycerides, which is identical to AL-Azawi.⁵ The results of the statistical analysis showed a mean of the control group (108.30 + 7.69 mg/100 mL) 230.65 + 9.40mg /100 mL). The high triglycerides may be due to impaired insulin secretion, which reduces the ability of the enzymes lipoprotein lipase to convert triglyceride into fatty acids and glycerol.¹¹ The study also shows the action of captopril to reduce the level of triglycerides(p <0.01), this is due to an increase in the efficiency of the pancreatic lipase enzyme, which leads to the rapid degradation of triglycerides

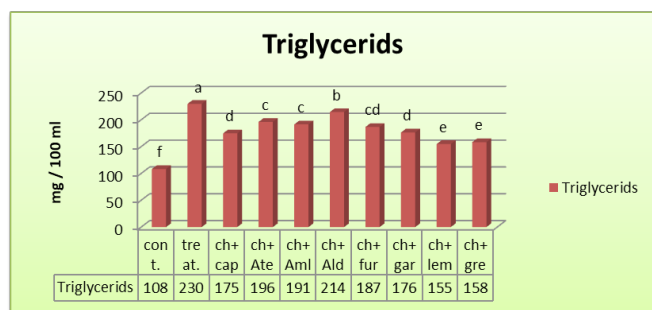


Figure 2: The effect of treatment with captopril, athenolol, amalodepine, aldomet, fruosamide, and garlic, green tea in the concentration of triglycerides (mg/100 mL) for the treatment group with induced atherosclerosis.

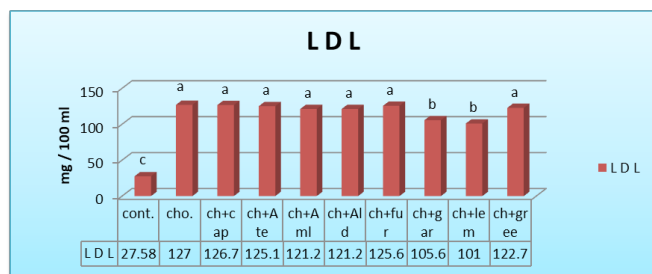


Figure 4: The effect of the treatment of captopril, athenolol, amalodepine, and aldomet, fruosamide and drink of garlic, lemon, and green tea in the level of proteins and low density of the treatment group suffering from induced atherosclerosis.

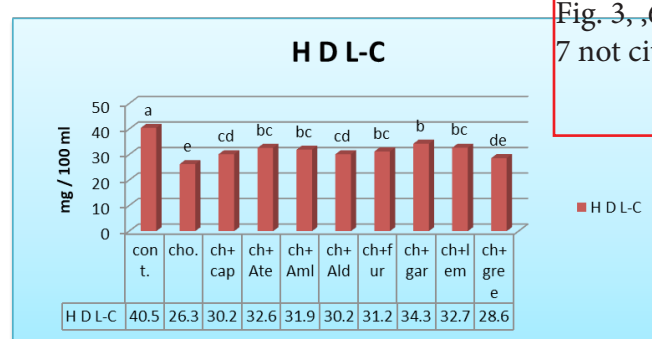


Figure 3: The effect of catechopropyl, atenolol, dalomite, amlodipine, fruseamide, and garlic, lemon, and green tea syrup in the concentration of high-density lipoproteins (mg/mL) for the treatment group with induced atherosclerosis.

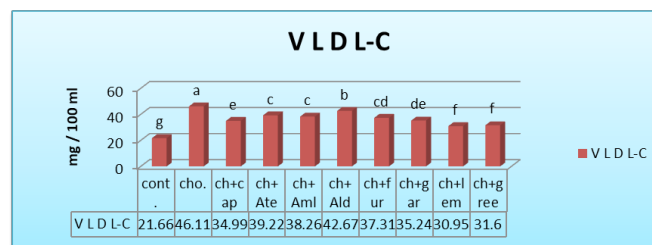


Figure 5: Effect of treatment with captopril, atenolol, amalodepine, aldomet, fruosamide, and garlic, lemon and green tea in the level of the very low-density lipoproteins of the therapeutic group suffering from induced atherosclerosis.

Fig. 3, ,6, and 7 not cited

to glycerol and fatty acids, That captopril is working to reduce the level of triglycerides within the body with an average of (213.35 + 9.68 mg/100 mL). Atenolol, amlodipine, aldumite, and fursimide reduced the level of triglyceride, although no studies were confirming the role of pharmacokinetics in lipid reduction. The mean averages were: atenolol (196.10 + 12.82 mg/mL 100 mL), 191. + 9.92 mg/100 ml), aldumit (191.40+, 4.78 mg/100 mL), Frusemide 186.5 ± 17.11 (mg /dL), but the cause, according to the researcher, is due to the resistance shown by the animal and its phylogenetic condition. The vegetable juices of garlic were recorded (176 + 24.7 mg/100), lemon (154.75 + 13.21 mg /100 mL) and green tea 186.56 + 17.11 mg /100 mL (p <0.01) was reduced the level of TG due to flavonoids in the three plants that reduce the levels of free fatty acids in the plasma and thus reduce the level of triglycerides and its role in inhibiting the enzymes needed to manufacture lipids and reduce cholesterol esters, which contribute to the formation of lipoprotein molecules and very low density of cholesterol VLDL rich in triglycerides and thus reduce production in liver.¹²

The results showed that there were significant differences between the different groups, showing a significant decrease in (p <0.05) in high-density lipoproteins in the group treated with cholesterol, when the results of the present study indicate a high significance (p ≤0.01) in HDL for all treatment groups except green tea group showed no significant difference.

The results of this study were edintical of a study by (4), and (5), when atherosclerosis was induced using cholesterol with the food of rabbits, the mean of the healthy group was (40.48 ± 8.2 mg/100 mL), and the cholesterol group was recorded (26.28 ± 0.63 mg/100 ml). The decrease in HDL-C levels in the cholesterol-treated group is due to liver dysfunction or functional pancreatic dysfunction, and the role of active oxygen groups leads to reduced HDL due to cholesterol degradation. The results show a significant increase (p <0.01) in high-density lipoproteins (31.57 ± 3.2 mg/100 mL) compared with the control group treated with cholesterol. This is what was noted by,¹¹ he referred to the role of captopril in raising the level of high-density lipoproteins (HDL_C). The reason was the inhibition of one of the enzymes responsible for synthesis cholesterol, thus increasing good cholesterol.

The atenolol record mean (32.63 + 3.2 mg/100 mL) and amlodipine had a record average of (26.28 +0.63 mg/100

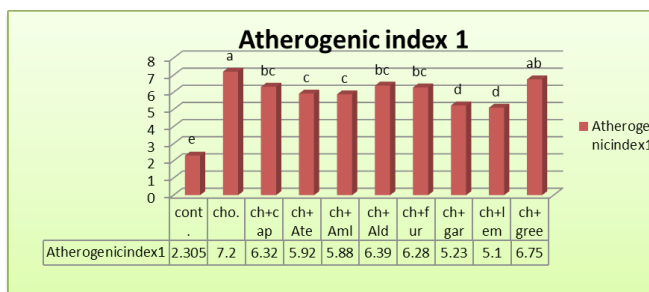


Figure 6: Effect of treatment with captopril, atenolol, amlodipine, aldomet, fruosamide, and garlic, lemon, and green tea syrup in the first treatment of the groups suffering from induced atherosclerosis.

mL) and no significant difference was observed,¹³ indicated that aldomet in HDL improvement was indicated in the study using this drug and its Effect on the lipid he found a rise and improvement in the level of HDL-C in the serum of rats, pointing out that the mythel dopa e despite its future side effects, but it is safe for the treatment of the so-called high-lipid Dyslipidemia, which is a good aspect of the health of patients, which is a cause the relaxation of vessels and facilitate the bloodstream allows free movement of blood, and this also recorded a significantly improved frusemide, (30.15 + 1.9 mg/100 ml) that role For frusemide, and amlodipine in improving the level of antioxidants were raised from the level of good protein Aquarius, for garlic, lemon and green tea recorded a high significantly rise p≤0.01) in the level of high-density lipoprotein, where the average of garlic was (34.26 + 1.9 mg /100 mL), Lemon 32.7 + 0.99 (mg/100 mL), green tea did not score significant difference 28.62 +2.92 (mg/100 mL), and may be due to the role of multiple phenols in green tea, lemon and garlic, which works in addition to its role of antioxidant, Enzymatic activity of catalase and superoxide dismutase in the liver 14 this may cause by the action of lecithin cholesterol acyltransferase (LCAT) and stimulate liver and intestinal cells to increase the production of APO-A, which is necessary in the formation of high-density lipoproteins;¹⁵

The results of the present study showed a significant increase in the concentration of low-density lipoproteins in the group treated with cholesterol (126.95 ± 8.1 g/100 ml) compared to the healthy control (27.58 ± 6.98 g/100 ml). This corresponds to.¹⁶ LDL-C, which is either liver disease or an abnormality of pancreatic gland activity that analyzes lipids by lipase, or high cholesterol due to food and fat intake.¹⁷ In all therapeutic groups, there was no effect of low blood pressure drugs, nor did any effect of green tea. The mean parameters were as follows: Captopril (126.71 + 17.5 mg /100mL), athenolol 125.13+ (7.91 mg/ 100 mL) amlodipen (122.7 + 11.9 mg /100mL) aldomet (122.7 + 11.9 mg /100 mL) furosemide 125,64 +11.92 mg/100mL, and green tea (122.7 + 11.9 mg/100 mL),in the level of low-density lipoprotein (LDL), in contrast to the effects of plant juices of garlic and lemon, which recorded a significant decrease in the level of LDL (105.00 + 13.52 (mg/100 mL)

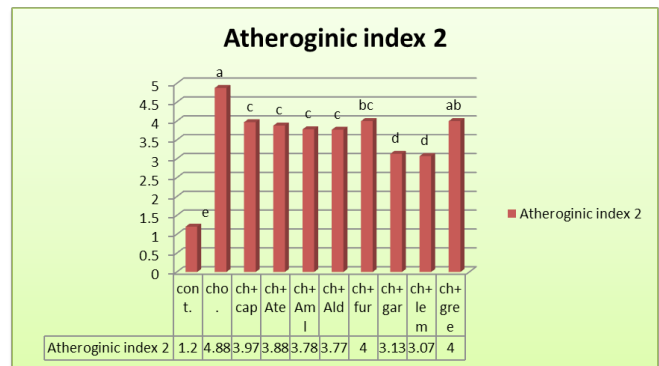


Figure 7: Effect of treatment with captopril, Atenolol, amlodipine, aldomet, furosmied and garlic, lemon, and Green Tea syrup at the level of the second treatment or the treatment group suffering from induced atherosclerosis.

because the role of garlic in blocking all types of oxygen and nitrogen interactivity,¹⁸ as well as lemon (101.02 + 4.53 mg /100 mL) as found by Abbas et al.,¹⁹ that the lipoproteins were decreased in chicken meat treated with oranges because of the presence of vitamins, C and B.²⁰

The results of this study showed a rise in the level of VLDL-Ch in the group treated with cholesterol compared to negative control with an average of 46.11 + 1.93 (mg /100 mL) and control group was 21.66 + 1.53 (mg /100 mL), this is identical with the study of 5 and can explain the increase of VLDL because the increases of the level of malondialdehyde (MDA) due to oxidative stress, accompanied by an increase in the level of serum lipoproteins and low-density lipoproteins, or due to increased VLDL-C from the synthesis of chylomicron 17 or due to thyroid dysfunction as the study by 20 indicates that cholesterol is added to food Rabbits have inhibited the secretion of thyroid hormones to T3 and T3 hormones. These hormones directly affect metabolism and lipoproteins as they affect the oxidation of lipids. The production of lipids is reduced by glucose, and the market is reduced as a result of oxidation. This will affect VLDL-C and even affect And thus increase their concentration in blood plasma.²²

The treatment group with the reduced BP drugs was significantly lowered the VLDL-C level where the mean of atenolol, acetyloprotein group (37.2 ± 3.74), amlodipine (39.22 ± 2.56 mg/100 mL) was indicated for the captopril group, and the amalotidine was protective (38.26 ± 0.97 mg/100 mL) (37.31 ± 3.42 mg/100 mL) despite the conflicting studies in this subject and agreement on the role of anti-hypertension drugs in the Effect on the level of low-density lipoproteins, the results of the study were consistent with the results of the.²² Which indicated a rise in the level of activity of catalase enzymes, superoxide dismutase and glutathione, hepatic antioxidant that occurred when taking anti-hypertension drugs that reduce oxidative stress due to drug treatment, thereby preventing peroxidation of lipid and thus lowering VLDL-C concentration in the serum, as well as high levels of vitamin C and A, known as antioxidants. The same applies to the three juices. A significant reduction in ($p \leq 0.01$) has been observed in the concentration of very-low-density lipoproteins in the serum of the animals treated with garlic, lemon, and green tea. A mean group of garlic was 35.24 ± 4.89 (mg/100 ml) the mean of lemon was 0.95 ± 2.64 (mg/100 ml) and was for green tea (31.65 + 4.59 mg/dL). This reduction is due to the role of flavonoids in inhibiting enzymes for the manufacture of lipids, as well as lowering the cholesterol esters involved in the formation of triglyceride-rich VLDL-C molecules and thus lowering their levels of liver production.¹² It is also due to its antioxidant role because of vitamins E, C, B and A, and amino acids such as thiene, in addition to its role in reducing the level of lipids by reducing the synthesis of cholesterol.

He treatment of male rabbits treated with cholesterol 1% with food resulted in a significant increase in ($p \leq 0.01$) in the first and second indications, respectively, compared to the control group. The first reference index of the group was

treated with cholesterol recorded (7.2 ± 0.90) and control group record (2.30 ± 0.45), while the second control-treated group record (0.28 ± 0.36) like atherosclerosis and control one (healthy) recorded 1.2 ± 0.40. This result was consistent with the results of many researchers who used cholesterol for the induced atherosclerosis of early experimental,²³ found that the increase in VLDL-C level is a result for the decline in the level of HDL-C and high LDL-C and can be the reason for this is due to add cholesterol in diet may have led to the inhibition of enzyme activity Lipoprotein lipase.

The results of the present study showed that low blood pressure medications reduced the levels of atherosclerosis, with a significant decrease in ($p \leq 0.01$) in the first indications of acetaminophen (3.84 ± 1.17), atenolol (5.4 ± 1.72 b) 2.01), aldumit (3.45 ± 0.733) frusemide (3.96 ± 0.99), garlic (3.88 ± 0.77) lemons(0.73 ± 0.77), green tea (3.340 ± 433), while the second indication showed a mean calculation of medicines and plants, such as captopril (1.43 ± 0.61), respectively 2.76 ± 0.53 (2.22 ± 0.740), dolomite (1.62 ± 0.274) (1.23 ± 0.28), garlic (1.59 ± 0.222), lemon 1.635 ± 0.58), green tea (1.27 ± 220).

This can be attributed to the role of drugs designed for beta-adrenergic blockers in reducing the release of adrenergic hormones and thus reduce the release of lipids and its level in blood serum and possibly because of the ability of these drugs to maintain and raise the level of antioxidants and enzymatic and non-enzymatic in the body when ingested such as catalase and glutathione for the addition of vitamins A, C, E, after the use of capotin, moditric, tannolol, furosemide, and amylobin. This will reduce the level of cholesterol, triglycerides, bad fats, and signs of response,²⁴ cholesterol in plant extracts resulted in a significant decrease in $p \leq 0.01$ in the first and second indications, but at different rates in each of the garlic, lemon and green tea plants. This may be attributed to the difference in the studied plants by their content. Active substances acting as oxidants such as alkaloids and phenolic compounds are important antioxidants that reduce atherosclerosis

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