

# One of the Elettaria Family of Herb is used as Hypolipidemic Agent

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## Abstract

**Summary:** Atherosclerosis is thought to be a disease of modern human beings and related to contemporary lifestyles. However, its prevalence before the modern era is unknown. The symptoms of arteriosclerosis are highly variable and can range from no symptoms (in the early stage of the disease) to heart attack or stroke (when the lumen of the artery is critically blocked). Sudden cardiac death can also be the first symptom of coronary heart disease. As a plaque grows along the lining of an artery, it produces a rough area in the artery's normally smooth surface. This rough area can cause a blood clot to form inside the artery, which can totally block blood flow. As a result, the organ supplied by the blocked artery starves for blood and oxygen. The organ's cells may either die or suffer severe damage. Atherosclerosis can narrow the major arteries that supply blood to the legs, especially the femoral and popliteal arteries. These two arteries are affected in 80% to 90% of people with this problem. The reduced blood flow to the legs may result in a crampy leg pain during exercise called intermittent claudication. If blood flow is compromised severely, parts of the leg may become pale or cyanotic (turn blue), feel cold to the touch and eventually develop gangrene. There are various drugs which reduces plasma lipids but with potential side effects. Herbal medication like Green Cardamom has potential to lower bad cholesterol, i.e. LDL-cholesterol and raise good cholesterol, i.e. HDL-cholesterol. In this work we compared hypolipidemic effects of Niacin with Cardamom. Seventy five hyperlipidemic patients were selected for research work. They were divided in three groups. Group-I was on placebo, group-II was given 1.5 grams Niacin, and group-III was advised to use powdered Cardamom thrice daily for the period of two months. Their lipid profile was measured at start of research and then on day-60. After two months therapy group-II reduced total cholesterol 30.8 mg/dl and LDL cholesterol 12.1 mg/dl and increased HDL cholesterol 5.6 mg/dl. In group-III Cardamom decreased total cholesterol 7.2 mg/dl and LDL cholesterol 8.8 mg/dl. HDL cholesterol in this group increased 4.9 mg/dl. When results were compiled and analyzed biostatistically, these changes were significant.

**Conclusion:** We conclude from the research work that Niacin has more effects on total cholesterol but effects of both drugs on LDL cholesterol reduction were almost same.

## Keywords

CAD, Hyperlipidemia, Mortality, Morbidity, Herbs, Prevention, Flavonoids

## Introduction

Atherosclerosis is easily confused with arteriosclerosis. The latter is a general term for hardening of arteries, for which atherosclerosis is one of the most common causes. The major treatment goal for CAD is to prevent significant narrowing of the arteries so that symptoms never develop and vital organs are never damaged. To do this, you would begin by following the healthy lifestyle outlined above. If you have high cholesterol that cannot be controlled by diet and

exercise, your doctor will likely recommend medication. The most common medicines used to lower cholesterol are statin drugs, also known as HMG-CoA reductase inhibitors. Statins block an enzyme called HMG-CoA reductase, which controls the production of cholesterol in the liver [1-4]. Obese patients with high plasma lipids levels, diabetic type-II patients with history of smoking, alcohol consumption, old age and with problem of nitrate intolerance are prone to face problem of oxidative stress [5]. It has been proved in many research trials that allopathic drugs or medicinal herbs with hypolipid-

emic potential can reduce overall oxidative stress in human body, making body less vulnerable to cause coronary artery disease and its consequences like MI [6, 7] Hypolipidemic drugs reduce low density lipoprotein cholesterol (LDL-c) in plasma and thus lower the chance of developing atherogenesis leading to increased risk for hypercholesterolemic patients to be victimized by coronary artery disease, and myocardial infarction [8]. Conventionally hypolipidemic drugs used are Statins, Nicotinic acid, Bile Acid Binding Resins and Fibrates, but all have characteristic of potential for low drug-patient compliance due to wide range of pharmacological and adverse effects [9]. Vitamin B-3 (Niacin), if given in large doses inhibits lipolysis in adipose tissue which is main source of plasma free fatty acids. In liver due to lack of these free fatty acids, no triglycerides or lipoproteins carrying these lipid forms (VLDL) will be synthesized. Low density lipoproteins (LDL) are synthesized from VLDL. Thus no availability of very low density lipoproteins (VLDL) causes reduced synthesis of LDL in plasma. Niacin also decreases clearance of apoprotein A-1 in plasma, so High Density Lipoproteins (HDL) which are linked with existence of these apoproteins are also increased [10, 11]. To get good drug-patient compliance many health related modern researchers have started to put their healing potential for developing alternatives drugs used in primary or secondary Hyperlipidemia. Cardamom or in urdu ILAICHI is one of the hypolipidemic herb, widely encouraged by cardiologists to be used for prevention of atherogenesis, and coronary artery disease [12]. Cardamom contains some Phenolic compounds and Flavonoids which act as free radical scavengers [13]. Green Ilaichi contains some chemical compounds which act as antioxidant at myocardial cells and hepatocytes. This medicinal herb also have characteristic to contain glutathione which acts as protection of normal visceral cells from damage due to formation of free radicals in various metabolic processes in human body [14]. Cardamom is also rich in powerful anti-oxidant mineral, Manganese and immune improving element Zinc. Its Magnesium and Potassium contents keep heart cells healthy and normalize systolic/diastolic blood pressure, preventing risk of developing coronary artery disease. A critical first step is improved knowledge on the agriculture-nutrition-health nexus. We need to go beyond a blind pursuit of indiscriminate agricultural growth. Instead, we should promote "smarter" growth by learning more about the health and nutrition impacts of different subsectoral patterns of agricultural development. Important steps to build up this knowledge base include investments in research, evaluation and education systems capable of integrating information from all three sectors. Atherosclerosis is responsible for the majority of deaths in our society. It is also responsible for a huge amount of morbidity. If one studies insurance tables, atherosclerosis causes a large contribution to years of potential life lost. Atherosclerosis is predominantly a disease of arteries – both large and medium-sized. It affects elastic and muscular vessels. Atherosclerosis may also involve veins when they become vein grafts and are exposed to arterial pressure [15].

## Material and Method

It was single blind placebo-controlled study conducted in Jinnah Hospital Lahore from July to November 2015. Seventy five hyperlipidemic patients were selected and enrolled for the study. Written, already explained and approved consent was taken from all patients. Inclusion criteria were age limit from 18 to 70 years of both gender primary or secondary hyperlipidemic patients. Patients suffering from any vital organ severe disease or their impaired function were excluded from the study. Alcoholics, cigarette smokers and patients taking regular medicine for their any physical or mental disease were also excluded. Seventy five patients were divided in three groups, comprising 25 patients in each group. Group-I were on placebo therapy. They were provided capsules contain grinded rice and mixed wheat. They were advised to take one capsule before meal, thrice daily for two months. Group-II patients were advised to take half Tablet Niacin 250 mg, thrice daily after each meal. They were advised to raise dose of Niacin tablets gradually after two days, until they tolerate dose of niacin up to two tablets of 250 mg, thrice daily after each meal for the period of two months, counting their day-0 from maximum tolerated dose of the drug. This titration of dose of drug was necessary because Niacin can cause flushing if taken in high doses at start. Group-III were advised to take one gram grinded green Cardamom powder mixed in black tea, thrice daily after each meal for the period of two months. Their base line lipid profile was determined by Freidewald Method. Total-cholesterol, LDL-cholesterol and HDL-cholesterol were main parameters we required for further calculation of change in these parameters. All patients were advised to visit clinic fortnightly for their follow-up. After two months therapy their lipid profile was measured again by same Freidewald Method. Data were expressed as the mean  $\pm$  Standard Deviation and "t" test was applied to determine statistical significance as the difference. A probability value of  $<0.05$  was considered as non-significant and  $P<0.001$  was considered as highly significant change in the results when pre and post-treatment values were compared.

## Results

After two months therapy Mean values were expressed in SD  $\pm$  SEM and paired t-test was applied to analyze results biostatistically. Following changes were observed in Total, LDL, and HDL cholesterol with expression of their statistical significance.

**Table 1.** Pre and Post Treatment Values with SD $\pm$ SEM and their Statistical Significance

Group	Parameter	At day-0	At day-60	Change	% change	p-value
G-I n=25	TC	228.2 $\pm$ 1.99	226.4 $\pm$ 1.23	1.8	0.8	>0.05
	LDL-C	178.4 $\pm$ 1.67	176.5 $\pm$ 1.09	1.9	1.1	>0.05
	HDL-C	40.7 $\pm$ 1.90	40.9 $\pm$ 2.98	0.2	0.5	>0.05
G-II n=22	TC	235.4 $\pm$ 1.11	204.6 $\pm$ 1.99	30.8	13.1	<0.001
	LDL-C	181.1 $\pm$ 2.87	169.0 $\pm$ 2.22	12.1	6.7	<0.01
	HDL-C	43.5 $\pm$ 1.99	49.1 $\pm$ 1.04	5.6	11.4	<0.01
G-III n=24	TC	239.0 $\pm$ 2.32	231.8 $\pm$ 1.33	7.2	3.0	<0.01
	LDL-C	188.8 $\pm$ 2.45	180.0 $\pm$ 1.95	8.8	4.7	<0.01
	HDL-C	39.6 $\pm$ 1.11	44.5 $\pm$ 1.55	4.9	11.0	<0.01

Key: G stands for group, G-I is for placebo group, G-II is for Niacin group, G-III is for Cardamom group, n stands for sample size, pre and post treatment changes are measured in mg/dl,  $\pm$  stands for standard error of mean, p-values  $>0.05$  indicates non-significant changes, p-values  $<0.01$  indicates significant changes, and p-values  $<0.001$  indicates highly significant changes in mean values.

## Discussion

Statistically speaking decrease in total cholesterol is highly significant while change in LDL-cholesterol is significant biostatistically. These results match with results of study conducted by Cantarella L, et al. [16] who observed about same changes in lipid profile of 107 patients. Our results of change in HDL cholesterol also match with results of Capuzzi DM, et al. [17] who observed 14% increases in HDL cholesterol of 55 hyperlipidemic patients. Mittal MK, et al. [18] explained that hypolipidemic effects of Vitamin B-3 (Niacin) can be achieved in doses that can damage liver. Soga T, et al. [19] conducted research and proved that one gram of Niacin per day lowered total cholesterol maximum up to 9.11 mg/dl and LDL cholesterol up to 6.90%. These results are in contrast with our results. This difference in two results can be due to low dose of the drug used in their research work. Bruckerteric, et al. [20] has warned researchers that vulnerability of hepatic damage cannot be avoidable in hypolipidemic doses of this vitamin B-3 (Niacin). To avoid frequent adverse effects and economic cost of conventional hypolipidemic agents like Niacin or Fibrates or even Statins, alternative hypolipidemic therapy by herbal medications are going to get popularity in different ethnic groups in developing countries. Green Cardamom is used generally in many cocktail food preparations in India, Pakistan, Bangladesh and Srilanka [21]. Our research study proved significant changes in total and LDL cholesterol in 24 hyperlipidemic patients, i.e. 7.2 mg/dl reduction in total cholesterol and 8.8 mg/dl decrease in LDL cholesterol. Changes in both parameters are biostatistically significant. Almost same results were observed by Babu PV, et al. [22] in LDL-cholesterol, but they proved lesser reduction in total cholesterol, i.e. only 1.9% decrease in total cholesterol in four hyperlipidemic patients when they used one gram of green cardamom for three months. This difference may be due to small sample size, though they used same amount of cardamom as we used in our study. Goto T, et al. [23] proved same increase in HDL cholesterol as we observed in our work. Galleano M, et al. [24] agree with Alam K, et al. [25] who wrote that wide variety of pharmacological effects by green Cardamom may cause metabolic processes of human body to affect carbohydrates, proteins and lipid metabolism beneficially but negligible adverse effects are not being evaluated which needs meta analysis and research on these herbs.

## Conclusion

It was concluded from the research work that Green cardamom herb is as hypolipidemic as Vitamin B-3 (Niacin), regard-

ing its effects on LDL and HDL cholesterol, but this herb's potential for reduction of total cholesterol is lower than Niacin.

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