ATHEROSCLEROTIC PLAQUES FORMATION AND MEDICINAL HERBS

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Abstract

Objective: *The aim of the study was to find the hypolipidemic effect of natural herbs such as Curcuma longa, Fenugreek leaves and Lemon on the cholesterol level of the body for prevention against atherosclerotic plaques.*

Materials & Methods: *In this study, we have compared the hypolipidemic effects of Fenugreek, Curcuma longa, and Lemon. The study was conducted at Jinnah Hospital Lahore-Pakistan from August to December 2018. Ninety hyperlipidemic patients of age group 19years to 70years were included in the study. Diabetic, alcoholics, hypertensive patients and those with impaired renal or liver functions were excluded from the study. After taking consent from all the participants. their base line lipid profile was taken in the biochemistry laboratory of the hospital. They were divided into three groups i.e. 30 patients in each group. Group-I was advised to take 500 mg of Curcuma longa (haldi) mixed in fresh milk without cream, thrice daily for two months. Group-II patients were advised to take 100 grams of Fenugreek leaves mixed with salad in each meal (thrice daily) for a period of two months. Group-III patients were advised to take 40 ml of fresh lemon juice mixed with 40 ml mineral water thrice daily for two months. They all were advised not to take heavy meal rich with any type of fat, etc. One hour daily brisk walk was advised to all participants. 15 days follow up visit was scheduled for them. After two months their lipid profile was re-determined.*

Results: *When results were compiled and statistically analyzed by applying paired 't' test, it revealed that Curcuma longa decreased total cholesterol, TG, LDL cholesterol 16.10, 20.01, and 17.59 mg/dl respectively. Fenugreek decreased total cholesterol, TGs, and LDL cholesterol 14.70, 17.33, and 17.06 mg/dl respectively. Lemon in two months therapy decreased total cholesterol, TGs, and LDL cholesterol 15.45, 10.13, and 11.97 mg/dl respectively. None of the above mentioned herbs raised HDL cholesterol significantly.*

Conclusion: *It can be concluded from this research work that Curcuma longa, Fenugreek leaves and Lemon are mild to moderately effective hypolipidemic herbs to lower total plasma cholesterol, triglycerides, and LDL cholesterol.*

Keywords: *Lipids, TG, LDL-Cholesterol, HDL-Cholesterol.tional study, Health Professionals.*

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INTRODUCTION

Medicinal herbs have therapeutic effects on human beings. Atherosclerotic problems are encountered with enhancement of LDL uptake by monocytes and macrophages.[1-2] In the liver, uptake

of plasma LDL is mediated via specific LDL receptors, but a scavenger receptor system is employed by macrophages. Plasma LDL must be modified prior to uptake by macrophages. Analysis of the lipid content in the oxidatively modified LDL from hyper lipidemic patients revealed that the level of lysophosphatidylcholine was greatly elevated, and the high level of the lysolipid was shown to impair the endothelium-dependent relaxation of the blood vessels.[3-7] In alllopathy blood lipid levels are normalized by statins, fibrates, niacin and bile acid binding resins (BABRs). All of these allopathy related drugs have low compliance ranges from mild compliance due to the metalic taste of BABRs to severe side effects like rhabdomyolysis by fibrates and statins.[8] Due to low compliance and adverse effects of conventionally used hypolipidemic agents, herbal medicines are going to be famous among Physicians, and Cardiologists.[9] Medicinal herbs like Curcuma Longa, Fenugreek, and Lemon contents are being used as mild to moderate hypolipidemic agents. Curcuma Longa commonly known as Haldi in India and Pakistan is used to lower plasma lipids, in view of their contents. It contains Curcuminoids (curcumin, demethoxycurcumin, and bisdemethoxycurcumin), turmerone, atlantone, zingiberene, proteins, and resins.[10] Curcumin reduces both the oxidation and circulation of oxidized levels of LDL cholesterol which leads to a reduction in the occurrence or treatment of already present atherosclerosis in the subjects.[11] Research has revealed that curcumin from turmeric is an extremely efficient agent in increasing cholesterol uptake by the liver cells.[12] Several independent studies have shown that curcumin increases the expression of cholesterol and lipoprotein receptors on the liver cells.[13] Curcumin also increases cholesterol and bile acid excretion in feces.[14] Additionally, curcumin also increases the amount of ABC (ATP-binding cassette) transporters. These transporters are basically involved in flushing out excess cholesterol from the inside of the macrophages. When the numbers of ABC transporters are increased on the surface of macrophage, the deposited cholesterol is effluxed out through these channels again into the blood. Through the blood, it reaches the liver where it is metabolized efficiently.[15] The composition of fenugreek includes a large number of chemical components. They include proteins and amino acids, flavonoids, saponins and steroidal saponins, coumarin, lipids, vitamins, minerals, galactomannan fiber and alkaloids, such as trigonelline. Extracts are available standardized to contain 50 percent saponins or 20 percent of the amino acid 4-hydroxyisoleucine.[16] Treatment with fenugreek. Seed powder normalized the enhanced lipid peroxidation and increased susceptibility to oxidative stress associated with the depletion of antioxidants.[17] The steroidal saponins (diosgenin, yamogenin, tigogenin and neotigogenin) are thought to inhibit cholesterol absorption and synthesis and hence its potential role in arteriosclerosis.[18] Phenolics in Curcuma Longa have potential health benefits mainly due to their antioxidant properties such as reactive oxygen species (ROS) scavenging and inhibition, electrophile scavenging and metal chelation.[19,21]

MATERIALS AND METHODS

It was a single blind research study approved by the Research Committee of Jinnah Hospital Lahore. The research work was conducted at Jinnah Hospital, Lahore from August to December 2018 with approval of the Research ethics committee of the Hospital. Ninety (n=90) hyperlipidemic patients were selected for research work using a convenience sampling technique. Written consent was obtained from all patients. Specific Performa was designed for research work. Hyperlipidemic patients were selected with age ranging from 19 to 70 years. Patients having hypertension, hypothyroidism, diabetes mellitus, alcohol addictive patients, peptic ulcer, any gastrointestinal upset, renal impairment, and any hepatic or cardiac problem were excluded from the study. All patients were divided into three groups (group-I, group-II, group-III), 30 patients in each group. Their baseline lipid profile data were taken and filed in specifically designed Performa, at the start of taking medicine, like lipid profile, blood pressure and pulse rate. Serum lipid profile (total cholesterol, HDL-cholesterol, triglyceride) parameters were determined after a 12 hour overnight fast by standard methods. LDL-cholesterol level was calculated according to Friedewald's formula. Thirty patients of group-I were advised to take 500 mg of Curcuma longa (haldi) mixed in fresh milk without cream, thrice daily for two months. Group-II patients were advised to take 100 grams of Fenugreek leaves mixed with salad in each meal (thrice daily) for a period of two months. Group-III patients were advised to take 40 ml of fresh lemon juice mixed with 40 ml mineral water thrice daily for two months. They all were advised not to take heavy meal rich with any

type of fat like junk food etc. One hour daily brisk walk was advised to all participants. 15 days follow up visit was scheduled for them. After two months their lipid profile was re-determined.

Statistical Analysis:

Mean values of the day-0 and day-60 of tested parameters (total cholesterol, LDL cholesterol, triglycerides, and HDL cholesterol) ± SD were taken to be analyzed statistically. SPSS 10 version 2.00.01.10 was used to analyze pretreatment and post treatment values of all parameters. Paired 't' test was applied to determine changes in pre and post treatment values. P-value >0.05 was considered as non-significant changes in tested parameters, and p-values <0.01 were considered as significant changes. All parameters were measured in milligram per dl.

RESULTS

When results were compiled and statistically analyzed by using SPSS version 20, it revealed that curcuma longa decreased triglycerides (TG), total cholesterol (TC), and LDL cholesterol of 29 hyperlipidemic patients by 20.01, 16.10, and 17.59 mg/dl respectively. Raise in HDL cholesterol in this group was 03.70 mg/dl. Fenugreek leaves reduced TG, TC, LDL cholesterol of 28 hyperlipidemic patients by17.33, 14.70, and 17.06 mg/dl respectively. Lemon juice reduced TC, TG, and LDL cholesterol by 15.45, 10.13, and 11.97 mg/dl respectively. HDL raised 03.55 mg/dl in this group. Changes in all tested parameters and their statistical significance are shown in the following table.

DISCUSSION

Atherosclerosis is defined as hardening and narrowing of the arteries that silently and slowly blocks arteries, putting blood flow at risk. It's the usual cause of heart attacks, strokes, and peripheral vascular disease. In our results lemon, curcula longa, and Fenugreek proved that significant reduction occurs in TC, TG, LDL cholesterol by using these herbal preparations/mixtures. But all of these three herbs have no significant influence on HDL cholesterol. The same results were proved in the study conducted by Wiseman SA et al who described that pectin present in these three herbs inhibit the enterohepatic circulation of bile acids and excrete cholesterol in feces.[22] The study present in Fenugreek is responsible for inhibition of cholesterol synthesis.[23] Gidez LI et al stated that herbal medications have more than one or two mechanisms to balance plasma lipids in hyperlipidemic patients.[24] Bingham SA et al stated that the major reasons for hypercholesterolemia in today's world are obesity, consuming high fat food, diabetes and having a family history of high cholesterol.[25] This disorder is reported to affect a large number of people all across the world and is one of the leading causes of death as well. Cholesterol is reduced in the body by managing weight and diet. Regular exercise, lesser consumption of fatty foods, more consumption of fruits and vegetables help in ameliorating the symptoms of hypercholesterolemia. However, in most cases, anti- hypertensive and anti-cholesterol drugs are also required, especially in chronic cases. There are several problems associated with medications and people are now switching towards newer and less toxic therapies to control and reduce cholesterol levels in the body. Several natural herbs, supplements and food products are known to maintain healthy cholesterol levels and reduce cholesterol in mild hypercholesterolemia. These therapies, if opted, help in preventing the disorder but are less helpful in chronic cases of this disease. In an experiment, controlled dosing of turmeric was used to feed hypercholesterolemic rabbits and the effects on LDL oxidation were analyzed. It was found that turmeric extracts efficiently and quickly reduced

Table 1: Showing parameters values before and after treatment with their statistical significance in group-1(n = 29) (Curcuma longa or haldi)

TC at day-0 271.87±1.04	TC at day-60 255.77±2.77	The difference in mg/dl 16.10	P-value= <0.001
TG at day-0 216.09±2.43	TG at day-60 196.08±2.45	20.01	P-value= <0.001
LDL-C at day-0 179.65±2.87	LDL-C at day-60 162.06±2.51	17.59	P-value= <0.001
HDL-C at day-0 37.95±1.45	HDL-C at day-60 41.65±1.91	3.70	P-value= <0.001

Table 2: Showing parameters values before and after treatment with their statistical significance in group-2 (n = 28) (Fenugreek or methi)

TC at day-0 280.56±1.06	TC at day-60 265.86±2.65	Difference 14.70	P-value= <0.001
TG at day-0 224.87±1.55	TG at day-60 207.54±1.98	17.33	P-value= <0.001
LDL-C at day-0 213.13±2.78	LDL-C at day-60 196.07±1.56	17.06	P-value= <0.001
HDL-C at day-0 35.19±2.32	HDL-C at day-60 38.08±1.67	2.89	P-value= <0.001

Table 2: Showing parameters values before and after treatment with their statistical significance in group-2 (n = 28) (Fenugreek or methi)

TC at day-0 280.56±1.06	TC at day-60 265.86±2.65	Difference 14.70	P-value= <0.001
TG at day-0 224.87±1.55	TG at day-60 207.54±1.98	17.33	P-value= <0.001
LDL-C at day-0 213.13±2.78	LDL-C at day-60 196.07±1.56	17.06	P-value= <0.001
HDL-C at day-0 35.19±2.32	HDL-C at day-60 38.08±1.67	2.89	P-value= <0.001

Table 3: Showing parameters values before and after treatment with their statistical significance in group-3 (n = 29) (Lemon water)

TC at day-0 258.21±2.12	TC at day-60 242.76±1.89	Difference 15.45	P-value= >0.05
TG at day-0 246.56±2.11	TG at day-60 236.43±2.43	10.13	P-value= >0.05
LDL-C at day-0 179.08±2.87	LDL-c at day-60 167.11±1.77	11.97	P-value= >0.05
HDL-C at day-0 36.22±1.77	HDL-C at day-60 39.77±1.55	3.55	P-value= >0.05

KEY: All values are written in mean and ± stands for standard error of the mean. T-C= serum total cholesterol, TG= serum triglycerides, LDL-C= low density lipoprotein cholesterol, HDL-C= high density lipoprotein cholesterol. All parameters pre and post-treatment are measured in mg/d. n = sample size. P-value <0.01 stands for significant change, P-value >0.05 stands for non-significant change.

the levels of cholesterol in the blood along with the incidences of atherosclerosis with time.[26] The reason for these therapeutic effects, when analyzed, showed the preventive action of turmeric on the oxidation of LDL cholesterol. Mattern T et al have also explained the same important mechanism of action of turmeric that inhibits enterohepatic circulation causing biosynthesis of bile acids instead of cholesterol by hepatocytes.[27] The results obtained from research work conducted by Geleijnse JM et al revealed that all extracts of the fenugreek exhibit antioxidant activity.[28] These findings suggest that the fenugreek extracts could act as a potent source of antioxidants. Magee E et al mentioned that many herbs and their constituents have potential to reduce total plasma cholesterol, LDL cholesterol, and triglycerides but they do not raise HDL cholesterol because it needs special plasma proteins as lipoproteins responsible for structural and functional integrity of HDL particles.[29] Jhumarr J et al, Loversa T et al, hundahg P et al, and Sueawath JJ et al described about citrus fruit Lemon that its Citric acid is antioxidant which lead to decrease oxidative stress in human body.[30,31,32,33] Most Pakistanis rely on unani medicine, finding it efficacious, safe, and cost effective. The use of herbal medicines and homeopathy is also widespread. The National Institute for Health has established a section on traditional medicines.[34-38]

CONCLUSION

It can be concluded from this study that Curcuma longa, Fenugreek leaves and Lemon are mild to moderately effective hypolipidemic natural herbs that lower total plasma cholesterol, triglycerides, and Low density lipoprotein cholesterol levels.

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