Research Article

E ect of Dried Ginger (Zingiber o cinale) on Serum Total Cholesterol Level in Hyperlipidemic Patients

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Abstract |

Objective: To study the e ect of dried ginger on serum cholesterol and to compare the pre and post interventional serum cholesterol level in hyperlipidemic patients.

Methods: It was a randomized, single-blind, placebo controlled study in which 100 hyperlipidemic patients, 50 in treatment group and 50 in placebo group, participated. Baseline sampling of subjects, with ginger in diet, was done before administration of first dose. Ginger capsules and placebo were administered orally to the respective groups, for 30 days. Blood samples were collected next day after administration of the last dose. Lipid profile tests were performed on samples and readings were recorded in tables. Data was reported as means ± SEM. Means of intervention values, both pre and post, were compared using a paired t-test, p - value ≤ 0.05 was considered as significant.

Result: It was found in treatment group, there was a substantial decrease (p-value = 0.000) in serum cholesterol level of hyperlipidemic patients. Whereas, in placebo group, the serum cholesterol level changed insignificantly (p-value = 0.168).

Conclusion: This finding shows that dried ginger powder in a dose of 3g/day can significantly decrease serum cholesterol level in hyperlipidemic patients.

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Introduction

Hyperlipidemia is a word used for abnormally raised levels of any or all of lipids in plasma.[1] Cholesterol is a waxy steroid that is synthesized in liver or intestine. It not only helps in the production of hormones but also in the stability of membranes. It is transported in blood plasma in combination with lipoproteins. It is an important structural element of cell membrane in mammals. It is vital for appropriate membrane permeability and fluidity. Moreover cholesterol is an important factor for the production of bile acids,[2] steroid hormones and vitamin D.

There are di erent types of cholesterol like, total cholesterol, good cholesterol which is labeled as HDL and bad cholesterol which is labeled as LDL.[3] Factors contributing to high cholesterol levels are unhealthy life style and bad dietary habits. Other causative factors are lack of exercise, alcohol abuse, being overweight, and having a sedentary lifestyle.[4]

Hyperlipidemia includes conditions like hypercholesterolemia and hypertriglyceridemia, which are associated with an increase in plasma concentration of cholesterol and triglycerides and respectively.[5] Hyperlipidemia is highly prevalent in Pakistani popu-

lation.[6] It is closely associated with heart disease which is the most common cause of death.[7] Natural herbs have been used regularly in abundance due to their beneficial e ects on health. Ginger and other herbs have been a component of most of tradi-tional herbal medicines for many centuries. Ginger has a botanical name of Zingiber o cinale, and is a part of Zingiberaceae family.[8] Zingiber has its origin in Greek word "Zingiberis" and Arabic word "zins-zebil ", meaning known already to prehistoric genera-tions. Whereas the usual term ginger gets its origin from Sanskrit word Sringavera, "gringa" means horn and "vera" means body . Its root known as rhizome, is used for culinary and medicine purposes. Ginger chemically exerts its e ect by its components essen-tial oils and pungent principals.[9] Essential oils are sesquiterpene hydrocarbons and monoterpenes[10] and pungent principles comprise of zingerone, gingerol and shogaol.[11] Ginger helps to treat di erent diseases like hypertri-glyceridemia, cardiac ailments, pain of gastric ulcer, malignancy, IBS irritable bowel syndrome and bacte-rial infections and increased cholesterol levels.[12] In customary oriental medicine ginger has been used for treating asthma, edema, ear pain, diarrhea, dyspnea, nausea and vomiting.[13] Di erent scientific studies have shown that ginger consumption reduces plasma cholesterol levels.[14] It also causes decrease synthesis of cholesterol by liver.[15] New classes of drugs used to manage hyperlipidemia are being developed day by day. It is the need of the hour to discover compounds, which carry more advantages than their complications. This now calls for new research, and development of new and better quality drugs with least side e ects. This is the basis that we have studied the e ect of dried ginger consumption on serum cholesterol in patients of hyperlipidemia.

Methods

This was a randomized, single blind placebo control-led study conducted in Department of Biochemistry of Postgraduate Medical Institute, Lahore General Hospital for a period of seven months. The study was conducted as per Helsinki declaration of human rights. It was approved by ethical review committee of PGMI, Lahore. The study included 100 patients, 50 each in treatment and placebo group. The study included hyperlipidemic patients of either sex, with an age group of 35-60 years. Whereas individual who were diabetic, pregnant, had su ered from transient ischemic attacks, having hypersensitivity to ginger or were receiving lipid lowering drugs were not includ-ed in the study. Also patients su ering from malig-nancy, peptic ulcer, urinary tract and kidney diseases were excluded. All the subjects gave an informed consent before participating in the study. They refrained from ingesting any other medication known to alter lipid levels for the period of enrolment. Their history along with dietary habits was recorded in a questionnaire. The subjects did not change their medication and dietary habits during intervention phase. Locally grown dried ginger was identified and purchased from the market. Ginger root was oven dried at 70°C overnight to remove any moisture and fungal growth. It was grinded, weighed and put in capsules in a sterile environment. Placebo capsules were prepared using lactose. Baseline sampling of subjects (fasting), with ginger they normally took in the diet was done before administration of first dose of ginger. Capsules filled with ginger powder 3g/day in two divided doses along with placebo were administered orally to subjects in treatment and placebo groups respectively for 30 days[(16)]. Fasting blood samples were collected next day after the administration of last dose of ginger. Data was report-ed as mean ± SEM. Means of pre and post interven-tion values were compared within the groups using paired t-test. A p- value ≤ 0.05 was considered as significant.

Results

In treatment group there was a significant decrease (p-value = 0.000) in blood cholesterol level of hyper-lipidemic patients from 199.1 ± 4.56 to 161.1 ± 3.18. Whereas, in the placebo group, the blood cholesterol level changed insignificantly (p-value = 0.168) from 198.6 ± 4.65 to 199.6 ± 4.76.

Discussion

The present study was designed to evaluate the e ect of administration of dried ginger powder (Zingeber o cinale) in patients su ering from hyperlipidemia. Hyperlipidemia is a medical term for increased amount of lipids in plasma.[1] This is a condition of metabolism that can lead to so many diseases.[17] If left untreated it can lead to coronary artery disease which can be fatal.[7] The conditions include disorders

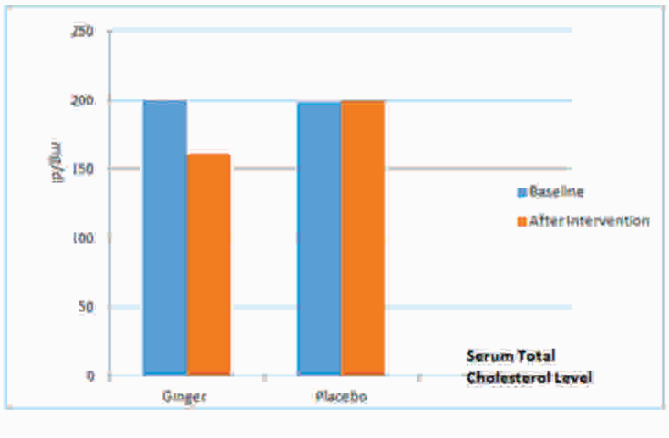
Figure: *Graphical Representation of E ect of Treat-ment on Serum Total Cholesterol.*

characterized by elevated blood cholesterol and triglycerides.[5] Hyperlipidemia is highly prevalent in Pakistani population.[6] As it is a modifiable risk factor

Table 1: *Result of Treatment on Serum Total Cholesterol Level*

Name of Parameter	Ginger (Treatment) Group		p-value	Result	Placebo Group		p-value	Result
	Baseline Mean ±SEM	After Treatment Mean ±SEM			Baseline Mean±SEM	After Treatment Mean ±SEM		
Serum Total Cholesterol (mg/dl)	199.1 ± 4.56	161.1 ± 3.189	0.000	Highly significant	198.6 ± 4.656	199.6 ± 4.765	0.168	Not significant

Values are expressed as mean ± S.E.M. and p-value less than or equal to 0.05 is considered significant.



for coronary artery disease it desires improved control. For this, precautionary screening programs and changes in life style behaviors need to be stressed upon in community.[18] Ginger (Zingeber o cinale) is well reputed for its medicinal properties. Traditional herbal practitioners have used ginger for treatment of many diseases since ages.[9] The conditions included infections, respira-tory problems, headaches, morning sickness and elevated cholesterol levels.[15] In the present study, a substantial decrease in serum cholesterol (p = value 0.000) was observed when hyperlipidemic patients were administered 3g of ginger per day. This confirms the findings of Alizadeh et al.[16], whose studies showed a marked decrease in serum choles-terol after administration of ginger for 45 days. Also comparable is a study done by Li et.al.[20] They observed the e ect of 6-gingerol on hepatic choles-terol metabolism and its regulation at genetic level. Results showed that both cellular total cholesterol and free cholesterol decreased. It was found that 6-GN regulated cholesterol metabolism via up-regu-lation of LDLR through activation of SREBP2 as well as up-regulation of cholesterol e ux-related genes LXRα and ABCA1. This also correlates with another study[21] who investi-gated the e ects of ginger and rosemary oil on rats and them to be hypocholesterolaemic. Similarly another study[22] done on rats showed that when ginger extract was administered intra-peritoneally or orally in a high dose (500mg/kg) for 4 weeks, it showed that serum cholesterol was reduced but triacylglycerol showed no change. Ginger through its e ect on genetic expression of various proteins improves lipid metabolism and reduces hyperlipidemia.[20] This lipid lowering e ect of ginger is due to inhibition of cholesterol synthesis in the liver.[15] The reduction in cholesterol levels has a positive correlation with enhanced excretion of faecal cholesterol and bile acids via up-regulation of hepatic CYP7A1 and down-regulation of mRNA of intestinal NPC1L1, ACAT2, and MTP.[23] Another way that we can explain the lipid lowering e ect is that this can be due to activity of cholesterol- 7 α hydroxylase, which is a rate limiting enzyme of cholesterol biosynthesis. This increases the conver-sion of cholesterol to bile acids in the liver[14] even-tually lowering serum cholesterol. Ginger is also shown to possess cholesterol lowering capability due to its angiotensin converting enzyme activity.[24] However the results of the present study di er from Verma et al.[25] Verma and co workers showed that when dried ginger powder was administered in a dose of 0.1g/kg for 75 days to rabbits, this did not decrease blood lipids in cholesterol fed rabbits.

Conclusion

Ginger (Zingiber o cinale) is reputed for its various medicinal properties. It had been used for the treatment of many ailments like high cholesterol levels, inflammation, asthma, migraine, morning sickness and infections. A lowering in serum total cholesterol level to a marked extent, by ginger consumed in a dose of 3g/day can play an important role in the prevention of diseases associated with it, like, cardiac complications and stroke.

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