

## Effects of Ginger on LDL-C, Total Cholesterol and Body Weight

Shah Murad<sup>\*</sup>, Khalid Niaz and Hina Aslam

Department of Pharmacology, Akbar Niazi Teaching Hospital, Islamabad, Pakistan

<sup>\*</sup>Corresponding author: Shah Murad, Professor of Pharmacology, Akbar Niazi Teaching Hospital, Islamabad, Pakistan, Tel: +923142243415; E-mail: Shahhmurad65@imcollege.edu.pk

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### Abstract

Hyperlipidemia whether it is primary or secondary to take high lipid-content diets can cause coronary artery disease. This condition can be prevented and treated by allopathy related drugs like vitamin B<sub>3</sub>, and statins. As these drugs have potential to develop severe side effects, many cardiologists have approved utilization of medicinal herbs to control hyperlipidemia. We selected its hypolipidemic and weight lost effects in primary and secondary hyperlipidemic patients. Type of Research study: It was placebo-controlled study. Area of research: Research was conducted in Jinnah hospital, Lahore, Pakistan. Duration of study: It was three months, from January 2014 to June 2014.

**Materials, methods and results:** Already well understood, clearly explained written consent was taken from sixty hyperlipidemic patients age range from 18 to 70 years. Both gender male and female patients were enrolled. Patients were randomly divided in two groups 30 patients were on drug ginger pasted-powder advised to take 5 grams in divided doses with their normal diet for the period of three months. Thirty patients were on placebo pasted-wheat powder, with same color as of ginger powder, advised to take 5 grams in divided doses with their normal diet for the period of three months. Their base line lipid profile and body weight was recorded at start of treatment and were advised to come for check-up, fortnightly. When duration of study was over, their lipid profile and body weight was measured and compared statistically with pre-treatment values. Three months treatment with 5 grams of Ginger decreased LDL-cholesterol 17.41%, total-cholesterol 8.83% and body weight 2.11%. When compared with placebo group, all changes in mentioned parameters were significant bio-statistically.

**Conclusion:** It was concluded from results of study that active ingredients of ginger lower plasma lipids and body weight significantly, eventually preventing development of coronary artery disease in primary and secondary hyperlipidemic patients.

**Keywords:** Hyperlipidemia; Ginger; LDL-cholesterol

### Introduction

To prevent coronary artery disease (CA), hypolipidemic medicines play major role. Many hypolipidemic drugs have already been proved to be useful in lowering serum lipid levels in patients [1]. However, its side effects in long term treatment were more reported and its prices were still expensive. Thus, efforts to develop effective and better hypolipidemic drugs had led to the discovery of natural medicinal herbs [2].

The beneficial uses of medicinal plants in traditional system of medicine of many cultures are extensively documented [3]. Several plants have been used as dietary adjuvant and in treating the number of diseases even without any knowledge on their proper functions and constituents [4]. Over 80% of the world population uses natural remedies as medicine and over 70% of doctors in Germany prescribe plant-based medicines [5]. Ginger (*Zingiber officinale*) is a natural dietary component, which has hypolipidemic, antiplatelet aggregation, antioxidant and anticarcinogenic properties [6].

Ginger is indigenous to southern China, spreading eventually to the Spice Islands, other parts of Asia and subsequently to West Africa and the Caribbean [7]. Ginger was exported

to Europe via India in the first century AD as a result of the lucrative spice trade. India remains the largest producer of ginger [8].

Hypolipidemic and antiplatelet therapy is an effective approach for preventing coronary heart disease [9]. Ginger components are suggested as a potential new class of platelet-activation inhibitors without the potential side effects of aspirin, which is most commonly used in this approach. In a comparison of gingerols and analogs with aspirin, ginger compounds were found to be less potent compared to aspirin in inhibiting arachidonic acid-induced platelet release and aggregation and COX activity.

However, several analogs had a significant inhibitory effect, suggesting that further development of more potent gingerol analogs might have value as an alternative to aspirin therapy in preventing ischemic heart disease [10,11]. Mechanism by which ginger may lower cholesterol is well understood by scientists and other researchers.

They explain that ginger activates an enzyme that increases body's use of cholesterol and lowers it. Several studies show that ginger can lower experimentally induced high cholesterol in animals, but more studies on ginger's effect on humans with high cholesterol are needed before the substance can be touted as a treatment for high cholesterol [12].

## Materials and Methods

Research study was conducted at Jinnah hospital Lahore Pakistan, from January 2014 to June 2014. Written consent was taken from sixty hyperlipidemic patients age range from 18 to 70 years. Both gender male and female patients were enrolled. Patients were randomly divided in two groups 30 patients were on drug ginger pasted-powder advised to take 5 grams in divided doses with their normal diet for the period of three months. Thirty patients were on placebo pasted-wheat powder, with same color as of ginger powder, advised to take 5 grams in divided doses with their normal diet for the period of three months.

Their base line lipid profile (for total serum cholesterol, LDL-cholesterol) and body weight was recorded at start of treatment and were advised to come for check-up, fortnightly. When duration of study was over, their lipid profile and body weight was measured and compared statistically with pre-treatment values. Serum total cholesterol was estimated by the enzymatic calorimatic method. Serum LDL-cholesterol was calculated by Friedwald formula [5].

LDL Cholesterol=Total Cholesterol-(Triglycerides/5+HDL Cholesterol)

Parameter	Pretreatment	Post-treatment	Change in %	p-value
LDL-Cholesterol	185.21 ± 2.01	157.72 ± 1.90	17.41%	<0.001
Total-Cholesterol	251.11 ± 2.00	230.71 ± 1.77	8.83%	<0.001
Body weight	79.01 ± 3.01	77.32 ± 2.61	2.11%	<0.05

**Table 1:** Showing pretreatment, post treatment values, change in percentage and their statistical significance in DRUG GROUP (n=27).

Parameter	Pretreatment	Post-treatment	Change in %	p-value
LDL-Cholesterol	143.25 ± 1.99	142.98 ± 2.61	0.18%	>0.05
Total-Cholesterol	190.47 ± 2.71	188.99 ± 2.50	0.77%	>0.05
Body weight	76.73 ± 2.19	76.56 ± 2.71	0.22%	>0.05

**Table 2:** Showing pretreatment, post treatment values, change in percentage and their statistical significance in PLACEBO GROUP (n=30). Key: ± indicates standard error of mean, p-value >0.05 indicates non-significant and P<0.001 indicates highly significant change in lipid profile. LDL-C means low density lipoprotein cholesterol mg/dl, T-C means total serum cholesterol mg/dl, and body weight is measured in kg.

## Discussion

In our research study ginger was used in thirty male and female hyperlipidemic patients for three months, which reduced LDL-cholesterol from baseline value of 185.21 ± 2.01 mg/dl to 157.72 ± 1.90 mg/dl. It is 17.4% change in this parameter, which is highly significant change statistically with p-value of <0.001. These results match with results of Bordia et al. [13] who mentioned that nearly same effects of ginger may be achieved when the drug is used for three months.

He has mentioned detailed explanations regarding effects of ginger in hyperlipidemic and hyperglycemic conditions. These results are in contrast with study results of Thomson et al. [14] who observed less effect on LDL-cholesterol, i.e., from 179.57 ± 2.29 mg/dl to 176.92 ± 2.11 mg/dl when they used three grams of ginger for the period of 6 months in 82 hyperlipidemic subjects.

These variations and too much contrast in these two comparable studies may be sample size, long duration of administration of

Body weight was determined by conventional method of usual weight machine data were expressed as the mean ± SD and paired 't' test was applied to determine statistical significance as the difference. A probability value of <0.05 was considered as non-significance and P<0.001 was considered as highly significant change in the results.

## Results

Three months treatment with 5 grams of Ginger reduced LDL-cholesterol from 185.21 ± 2.01 to 157.72 ± 1.90 mg/dl, which is highly significant change in the parameter (p-value <0.001). Serum total cholesterol at baseline was 251.11 ± 2.00 mg/dl, which reduced to 230.71 ± 1.77 mg/dl. This change is highly significant statistically, with p-value <0.001. Mean body weight decreased from 79.01 ± 2.91 kg to 77.32 ± 2.61 kg in three months therapy.

All changes are highly significant statistically, having p-value <0.001. In placebo group LDL-Cholesterol, serum total cholesterol and body weight reduction was 0.18, 0.77, and 0.22% respectively. All these changes are non-significant (p-value >0.05). Detailed changes are shown in following tables (Tables 1 and 2)

Our results are in contrast with study results of Guh et al. [19] who proved that there is no significant effect on body weight when 2 grams of ginger powder daily was used for two months, in one hundred volunteers having secondary hyperlipidemia. Possible and guessed, scientific reason for this difference may be type of hyperlipidemia, i.e., we included both primary and secondary hyperlipidemic patients, and they only included secondary hyperlipidemic patients.

Active ingredients of ginger were studied by Rohta et al. [20] and proved to be effective in lowering lipoproteins and Apo proteins. Apoproteins are integral part of lipoproteins like VLDL, LDL, HDL, and IDLs which are carrying different lipids from plasma to tissues in human body.

## Conclusion

It was concluded from the study that use of raw ginger 5 grams daily for three months reduced LDL-cholesterol highly significantly, while this dose of herb has moderate hypolipidemic effects on total cholesterol and body weight in hyperlipidemic patients.

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