ORIGINAL ARTICLE

Effect of Green Tea Consumption on HDL-Cholesterol

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ABSTRACT:
Objective: To evaluate the effect of green tea consumption on HDL-cholesterol level in hyperlipidemic patients
Materials and Methods: Forty hyperlipidemic patients were selected from Ghurki Trust Teaching Hospital Lahore and divided in two groups with 20 patients in each group.Group-I was advised to take, six hourly 180 ml green tea prepared by conventional method for two months. Group-II was labeled as control, not to take green tea for 2 months. Their HDL-cholesterol was measured at day-0 and on day-60. HDL-cholesterol was measured by separating other lipoprotein fractions using chemical precipitation with divalent ions such as Mg^{2+}, then coupling the products of a cholesterol oxidase reaction to an indicator reaction.
Results: After two months, it was observed that green tea consumption raised HDL-cholesterol by 7.5 mg/dl, while control group's HDL-cholesterol was raised 0.8 mg/dl only in this period.
Conclusion: Consumption of green tea raised HDL-cholesterol significantly and can be considered as negative risk factor for development of coronary artery disease.
Keywords: HDL level, Hyperlipidemic patients, Green tea

INTRODUCTION:

There are many reasons to develop atherogenesis in human body by using high fat diets and medicines. Atherogenesis can cause coronary artery disease leading to mortality due to heart attack and cardiac arrhythmias.Patients with coronary artery disease (CAD) commonly have low HDL cholesterol (HDL-C) and mildly elevated LDL cholesterol (LDL-C), leading to uncertainty as to whether the appropriate goal of therapy should be lowering LDL-C or raising HDL-C.[1,2,3,4,5,6,7] Many clinical studies suggest that HDL of 60 mg/dl is associated with dramatic reduction in rate of heart attack. Several studies suggest that higher levels of HDL are associated with less carotid and coronary atherosclerotic plaque. HDL particles are also protective against infections and even cancer, and are a major player in the body's fight against inflammatory patterns. In other words, HDL has clearly established itself as a blood particle that provides powerful protective functions.[8,9,10,11,12] Tea, prepared from the leaves of Camella sinensis, is the most popular beverage in the world except water. Black tea, made from the mild oxidation of green tea leaves, amounts to 80% of world tea production. Flavonoids are a group of polyphenols present in vegetables, fruits and beverages such as tea and wine[13,14,15]. Recent research studies shows that green tea lowers total cholesterol and raises HDL ("good") cholesterol in both animals and people. One population-based clinical study found that men who drink green tea are more likely to have lower total cholesterol than those who do not drink green tea. Results from one animal study suggest that polyphenols in green tea may block cholesterol from being absorbed in the intestine and also help the body get rid of cholesterol. In another small study of male smokers, researchers found that green tea significantly reduced blood levels of harmful LDL cholesterol[2,3,4]. It is thought that the antioxidants catechin and caffeine found in green tea may have a role in helping the body burn more calories-sometimes referred to as speeding up the metabolism-which can help weight loss[3,4,5,6,7]. Green tea preparations used for losing weight are extracts of green tea that contain a higher concen-tration of catechins and caffeine than the typical green tea beverage prepared from a tea bag and boiling water.[16] Eleven research studies involving 821 people found daily consumption of green and black tea (as a drink or a capsule) could help lower cholesterol and blood pressure.[17,18,19,20]

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MATERIAL & METHOD:

This research study was conducted at Ghurki trust teaching hospital (GTTH), Lahore Pakistan from June 2015 to September 2015. Forty hyperlipidemic patients were selected from GTTH for the study. Age of patients ranged from 18 to 70 years. Both gender male and female patients were enrolled. They were advised to discontinue any hypolipidemic medications and foods. Patients suffering from any metabolic disease, renal impairment, liver disease, and already victimized by cardiac problems were excluded from the research study.Forty patients were divided in two groups, twenty

individuals in each group. Group-1 was advised to take 180 ml green tea boiled in hot water every six hourly for the period of eight weeks. Group-II was considered as control group and was advised not to take green tea, black tea or coffee for eight weeks. Their baseline values of HDL-cholesterol were measured by separating other lipoprotein fractions using chemical precipitation with divalent ions such as Mg^{2+}, then coupling the products of a cholesterol oxidase reaction to an indicator reaction.

Statistical Analysis: Mean values with SD and SEM were analysed statistically by using SPSS version 22.0.0.0. Statistical significant was considered as p-value of changed parameter from day-0 to day-60. P-value of <0.001 was labeled as significant and p-value of >0.05 was considered as non-significant change.

RESULTS:

After eight weeks of trial, following changes were observed in selected parameter of HDL-cholesterol. In Group A HDL-C increased from 32.08±2.22 mg/dl to 39.54±1.96 mg/dl with a change of 7.5 mg/dl from base line day-0 to day- 60.This was found to be statistically significant. However in group B, HDL-C increased from 35.10±2.03 mg/dl to 35.92±3.14 mg/dl with a change of 0.8 mg/dl only and was statistically non significant.(Table-1)

Table: 1
HDL-C level before and after consumption of green tea

Group	Parameter	At D-0	At D-60	Change	p-value
Group-A (n=20)	HDL-C	32.08±2.22	39.54±1.96	7.5 mg/dl	<0.01
Group-B (n= 20)	HDL-C	35.10±2.03	35.92±3.14	0.8 mg/dl	>0.05

Group-A is tested group, Group-B is placebo group. 'n' in groups indicates sample size, mean values are measured as mg/dl, HDL-C stands for high density lipoprotein cholesterol, ± indicates SEM. P-value <0.01 indicates significant change and p-value >0.05 indicates non-significant change in parameter

DISCUSSION:

Green tea is alleged to boost weight loss, reduce cholesterol, combat cardiovascular disease, and prevent Cancer and Alzheimer's disease. We retested and reviewed its HDL-cholesterol raising effects in hyperlipidemic patients. By two months consumption of green tea (180 ml/six hourly) it was proved that green tea increased 7.5 mg/dl of HDL-cholesterol, which is significant raise in the parameter. These results match with results of study conducted by Zhang C [21] who proved that green tea consumption for 5 weeks raised high density cholesterol from 39 mg/dl to 45 mg/dl in 20 hyperlipidemic patients. Our results are in contrast with results of study conducted by Khan[22] who proved only 2.08 mg/dl raise in plasma HDL-cholesterol, when green tea was used by 17 hyperlipidemic patients for one month. This contrast may be due to less frequency of taking green tea by patients; ie 12 hourly. In our study control groups HDL-cholesterol was raised from 35.10±2.03 mg/dl to 35.92±3.14 mg/dl which is only 0.8 mg/dl increase in HDL-cholesterol. This change is non-significant when analysed statistically. Arab [23] described that less consumption or no consumption of green tea does not mean that hyperlipidemic patients HDL cholesterol can not increase by other healthy habits like aerobic exercise and less frequency of taking junk food which contain lesser raw fat. Khalesi [24] explained that lesser the predisposing factors for coronary artery disease, lesser the risk for developing heart attack and cardiac arrhythmias in human beings. Our results match with results of study conducted by Johson[25] in which 10 mg/dl HDL cholesterol was increased in 39 hyperlipidemic patients when they took 200 ml green tea every four hourly for the period of three months. They also mentioned hypoglycemic, and hypotensive effects of green tea consumption by primary hyperlipidemic patients suffering from metabolic syndrome. Not to smoke cigarettes, non-alcoholics and aerobic exercise can increase high density cholesterol in plasma. It is proved by cohort studies conducted by Peng[26] that old age, renal diseases, liver diseases, lesser lung function may contribute to lower high density lipoprotein cholesterol leading to development of atherogenesis, cardiac arrhythmias and cardiac arrest.

CONCLUSION:

After the research study it was concluded that green tea can raise HDL-cholesterol significantly and can be considered as negative risk factor for development of coronary artery disease.

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