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A study on anti hyper lipidemic effect of oral administration of cardamom in wistar albino rats.

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Abstract

Background:

Currently, a number of synthetic hypolipidemic drugs are available and are effective but the associated side effects such as diarrhea, nausea, myositis and abnormal liver function severely handicap their application. Some patients are resistant to or are intolerant of conventional pharmacotherapy. Therefore, alternative approaches are eagerly needed, and plant-based therapies attract much interest, as they are effective in reducing lipid levels and show minimal or no side effects

Aims:

To evaluate the anti hyperlipidemic activity of oral administration of cardamom extract.

Methodology:

A total of 18 adult male and female Wistar rats, weighing 150-200g, and 60 days of age were selected for this study and divided into three groups with 6 rats in each group. Control group rats received only Rodent chow& water. Hyperlipedimic group received high fat diet and water**.** Cardamom group received high fat diet and water + Cardamom extract. Blood samples are collected from caudal vein at the tail tip to estimate total cholesterol, HDL, LDL and VLDL and triglycerides.

Results:

Oral administration of Cardamom extract significantly ($p < 0.001$) reduced total cholesterol, HDL, LDL and VLDL and triglycerides.

Conclusion:

From this study, we can conclude that the oral administration of cardamom extract have benefitial effects on blood cholesterol, triglyceride, VLDL, HDL and LDL levels. However further pharmacological and biochemical investigations will clearly elucidate the mechanism of action and helpful in projecting these plant extracts as a therapeutic target in diabetes research.

Key words: Anti hyper lipidemic effect, cardamom extract.

Introduction

Lipids are important biomolecules. Cholesterol, for example, is an essential component of the human cell membrane and a precursor for steroid hormones and bile acids. Triglycerides also play an important role in transferring energy from food into body cells. However, any biomolecule in excess is not good for human health. Similarly, elevation of different forms of lipids in the bloodstream, a condition generally termed hyperlipidemia, causes a constant health problem. Because lipids are carried in the bloodstream, hyperlipidemia is always a threat to coronary arteries and the most important risk factor for coronary artery disease.[15] Clinical studies indicated that hypercholesterolemia is an essential risk factor for coronary artery disease (CAD), where low-density lipoprotein (LDL) cholesterol plays a major role in the atherosclerosis and pathogenesis of CAD and other vascular diseases[1] is one of the major causes of premature death globally [2] and it is expected to be the most important cause of mortality in India by the year 2015.[3]

Currently, a number of synthetic hypolipidemic drugs are available and are effective but the associated side effects such as diarrhea, nausea, myositis and abnormal liver function severely handicap their application. Some patients are resistant to or are intolerant of conventional pharmacotherapy. Therefore, alternative

approaches are eagerly needed, and plant-based therapies attract much interest, as they are effective in reducing lipid levels and show minimal or no side effects.[17]

Spices have been consumed in many cultures over centuries. They were primarily consumed because of their taste and aroma. However, recent scientific studies have proved their biological activities beyond their taste and smell. Spices are now known to possess anti-thrombotic, anti-atherosclerotic, hypolipidemic, hypoglycemic, hypotensive, anti-inflammatory, anti-arthritic and platelet aggregation inhibition activities.[20,21,22] Cardamom (or cardamon) belongs to Elettaria family Zingiberaceae. It is used to some extent in savoury dishes. Cardamom is a popular food additive and flavoring agent used by people all around the world.Its

medicinal properties has been described in ayurveda and unani system of medicine against gastrointestinal disorders,cardiac disorders renal and vasicular calculi dyspepsia debility anorexia,asthma,brochitis and halitosis.[4] It has been recommented that one teaspoonful of cardamom powder if taken with little honey twice a day is beneficial in high blood pressure and heart disease.[5] The various animal studies have shown its antioxident antihypertensive, gastroprotective antispasmodic' anti bacterial, antiplatelet aggregation, and anticancer properties.[6,7,8,9,10, 11]

In the present study, the anti hyperlipidemic activity of cardamom extract was evaluated in wistar albino rats fed on a high-fat diet.

Materials and methods

Subjects

A total of 18 adult male and female Wistar rats, weighing 150-200g, and 60 days of age were selected for this study. The rats were housed in polypropylene cages (30x22x14cm) and fed with commercial pellet rat chow and water and maintained under standard laboratory conditions with 12 :12 h light : dark cycle with a room temperature of 28±4°C. The rats were randomly assigned to three groups with 6 rats in each group.

Materials

Cardamom extract

Cardamom extract (Sample no: NT-631A) was received as a gift from KANCOR-Ingredients Limited, Ingredient solutions partnership,Oleoresin Manufacturer and pioneers of spice extraction industry, Manufacturing & Export Kancoor Road, Angamaly South, Kerala, India.

Experimental design

Eighteen rats were divided into three groups, comprising six rats in each group. .

Control Group

Served as normal control and received only Rodent chow& water.

Hyper lipidemic Group

Received high fat diet and water

Cardamom group

High fat diet and water + Cardamom extract

This procedure continued for 30 days. After 30 days rats were kept fast on overnight, blood collected from caudal vein at the tail tip to estimate total cholesterol, HDL, LDL and VLDL and triglycerides. The values are compared between the three groups to test the efficacy of cordomom extract. Estimation of total cholesterol is performed

by CHOD-PAP method.[12] Estimation of triglycerides is performed by GPO-PAP method.[13] Estimation of HDL and LDL is performed by precipitation method.[14]

Data analysis

T- test, One way ANOVA is used for analysis of data.

Ethical approval

The study protocol was approved by Institutional Ethics Committee of Little Flower Medical Research Centre, Angamaly.

Results

	Group	Mean	t	df	P value
Total cholesterol	Control	63.77±4.49	-7.642	10	<0.001
	Hyper lipidimic	97.50±9.83			
triglyceride	Control	66.67±12.56	-2.000	10	.073
	Hyper lipidimic	76.92±.00			
VLDL	Control	13.33±2.50	-1.999	10	.074
	Hyper lipidimic	15.38±.00			
HDL	Control	27.78±6.80	4.076	10	.002
	Hyper lipidimic	15.58±2.74			
LDL	Control	22.66±4.92	-8.96	10	<0.001
	Hyper lipidimic	66.55±10.95			

Table:-1 Mean values of total cholesterol, triglyceride, VLDL, HDL and LDL in control and hyper lipidimic groups.

Mean total cholesterol is higher in hyper lipidimic (97.50+9.83) than control group (63.77+4.49) and is statistically significant ($p < 0.001$). Mean Value of triglycerides is

higher in hyperlipidimic group (76.92+.00) than control group (66.67+12.56). However this is not statistically significant (pvalue .073). Mean VLDL value of hyperlipidimic group is higher (15.38+.00) than control group (13.33+2.50).

This is not statistically significant (p .074). Mean value of HDL is lower in hyperlipidimic group is (15.58+2.74) than control group (27.78+6.80). This is statistically significant (pvalue .002). Mean value of LDL is higher in hyperlipidimic group (66.55+10.95) than control group (27.78+6.80). This is statistically significant ($p < 0.001$).

	Group	Mean	t	df	P value
Total cholesterol	Control	63.77±4.49	2.712	10	.022
	Cardamon	56.52±4.77			
triglyceride	Control	66.67±12.56	.000	10	1.000
	Cardamom	66.67±7.94			
VLDL	Control	13.33±2.51	-.001	10	.999
	Cardamom	13.33±1.59			
HDL	Control	27.78±6.80	1.342	10	.209
	Cardamom	23.61±3.40			
LDL	Control	22.66±4.92	0.99	10	.344
	Cardamom	19.58±5.81			

Table:-2 Mean values of total cholesterol, triglyceride, VLDL, HDL and LDL in control and cardamom groups.

Mean value of total cholesterol in cardamom group is lower (56.52+4.77) than control group (63.77+4.49). This is not statistically significant (p value .022).

Mean value of triglycerides is almost equal in control and cardamom groups. Mean value of VLDL is almost equal in control and cardamom groups. Mean value of HDL in cardamom group is lower (23.61±3.40) than control group (27.78±6.80). This is not statistically significant (p value .209). Mean value of LDL in cardamom group is lower

(19.58±5.81) than control group (22.66±4.92). This is not statistically significant (p value .344).

	Group	Mean	t	df	P value
Total_ cholesterol	Hyper lipidemic	97.50+9.83	9.186	10	<0.001
	Cardamon	56.52+4.77			
triglyceride	Hyper lipidemic	76.92+.00	3.162	10	.010
	Cardamon	66.67+7.94			
VLDL	Hyper lipidemic	15.38+.00	3.162	10	.010
	Cardamon	13.33+1.59			
HDL	Hyper lipidemic	15.58+2.74	-4.507	10	.001
	Cardamon	23.61+3.40			
LDL	Hyper lipidemic	66.55+10.95	9.280	10	<0.001
	Cardamom	19.58+5.81			

Table:-3 Mean of total cholesterol, triglyceride, VLDL, HDL and LDL in hyper lipidemic and cardamom group.

Mean total cholesterol in cardamom group is lower (56.52+4.77) than hyper lipidemic group (97.50+9.83). This is statistically significant (p value <0.001). Mean triglycerides in cardamom group is lower (66.67+7.94) than hyper lipidemic group (76.92+.00). However this is not statistically significant (p value .010). Mean VLDL in cardamom group is lower (13.33+1.59) than hyper lipidemic group (15.38+.00).

However this is not statistically significant (p value .010). Mean HDL of cardamom is higher 23.61+3.40 than hyper lipidemic group 15.58+2.74 and in, which is not statistically significant (p value .010). Mean LDL in cardamom group is lower (19.58+5.81) than hyper lipidemic group

(66.55+10.95), which is statistically

significant (p value <0.001).

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Total_cholesterol	Between Groups	8144.067	4	2036.017	59.053	<0.001
	Within Groups	861.950	25	34.478		
	Total	9006.017	29			
triglyceride	Between Groups	4023.767	4	1005.942	15.180	<0.001
	Within Groups	1656.683	25	66.267		
	Total	5680.450	29			
VLDL	Between Groups	160.797	4	40.199	15.181	<0.001
	Within Groups	66.200	25	2.648		
	Total	226.997	29			
HDL	Between Groups	1334.240	4	333.560	25.527	<0.001
	Within Groups	326.669	25	13.067		
	Total	1660.910	29			
LDL	Between Groups	12780.004	4	3195.001	71.311	<0.001
	Within Groups	1120.102	25	44.804		
	Total	13900.105	29			

Table:-4 comparision of total cholesterol, triglyceride, VLDL, HDL, LDL within the groups and between the groups

Total cholesterol, triglyceride, VLDL, HDL, LDL within the groups and between the groups compared by one way ANOVA have significant difference with ($p < 0.05$) and $p < 0.001$.

Discussion

Hyper lipidemia is considered to be one of the greatest risk factors contributing to the prevalence and severity of cardiovascular diseases. Management of hyper lipidemia with the agents devoid of side effects is still a challenge to the medical system. This concern has led to an increased demand for natural products with anti hyper lipidemic activity, having fewer side effects. Dietary factors play a key role in the development of various diseases including cardiovascular disease. Epidemiological studies have shown that diet rich in fruits, herbs and spices are associated with low risk of cardiovascular disease.[16]

Cardamom was active in reducing lipids profile of diabetic rats.[18] Dietary supplementation of Greater cardamom favorably modifies lipid profile and significantly enhances fibrinolytic activity and total anti-oxidant status in patients with ischemic heart diseases.[19]

In this study we investigated the anti hyperlipidemic activity of cardamom extract in wistar albino rats fed a high-fat diet. The present experimental study provides further evidence that oral administration of cardamom extract for 30 days produced a significant anti hyper lipidemic effect.

Conclusion

From this study, we can conclude that the oral administration of cardamom extract have benefitial effects on blood cholesterol, triglyceride, VLDL, HDL and LDL levels. However further pharmacological and biochemical investigations will clearly elucidate the mechanism of action and helpful in projecting these plant extracts as a therapeutic target in diabetes research.

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