



RESEARCH ARTICLE

ANTI-LIPIDEMIC EFFECT OF APIUM GRAVEOLENS AND CYMBOPOGAN FLEXUOSUS IN
DIABETIC RATS

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ABSTRACT

In the present work, the hypolipidemic activity of the *Apium graveolens* and *Cymbopogan flexuosus* was evaluated. It showed significant decrease in the levels of serum Total cholesterol (TC), Triglycerides (TG), Low density lipoprotein (LDL), Very low density lipoprotein (VLDL) and significant increase in the level of High density lipoprotein (HDL) when administered orally for 28 days to streptozotocin induced hyperlipidemic rats at a dose of 200, 400, 600 mg/kg. As *Apium graveolens* and *Cymbopogan flexuosus* have hypolipidemic activity, these plants can be used as potential medicine for cardiovascular diseases.

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INTRODUCTION

Hyperlipidemia is considered as a risk factor involved in the development of cardiovascular disease (Frishman, 1998). High lipid levels can harden the arteries or speed up the process of atherosclerosis. It is considered as one of the five leading causes of the death in the world (NCEP, 2002). Nowadays, there are numerous hypolipidemic drugs for clinical use. However, the pharmacologists and chemists have been perplexed by the characteristic profiles of toxic side effects including numerous harmful syndromes (Williams, 1991; Kamaeswara Rao *et al.*, 1999), which can increase the risk of heart disease, stroke and other vascular diseases. Thus, an investigation of hypolipidemic agents with negligible side effect seems important. In recent researches, there has been a growing interest in the ingredients of natural plants, vegetables and cereals, not only for their radical-scavenging activities, but also due to their neglectable physical side effects.

MATERIALS AND METHODS

Procurement of Animal

Male Albinorats of Wistar strain (130±20gm) were procured from the laboratory animal house, PSG Institute of Medical Science and Research, Coimbatore, Tamilnadu, India. The animals maintained under constant room temperature 22°C-24°C with 12 hours day and night cycle were allowed to get acclimatized to standard laboratory diet pellets and filtered water *ad libitum* for fourdays. Ethical clearance for the handling of experimental animals was obtained from the Institutional Animal Ethics Committee (IAEC), ministry of social Justice and Empowerment, Government of India (CPCSEA No: 158/1999/CPCSEA).

Induction of Diabetes

Animals were allowed to fast for 13 hours and were injected with freshly prepared streptozotocin (50mg/kg body weight, *i.p*) prepared in citrate buffer pH 4.5. After 72 hours of streptozotocin injection, the diabetic rats with glucose level greater than 250mg/dl were selected (Perfumi *et al.*, 1996) and maintained over a period of 28days.

Preparation of Plant Extract

The shade dried leaves were powdered and subjected to successive solvent extraction in different solvent and then distilled, evaporated and vacuum dried as per standard procedure (Rupashree, 1999).

Experimental design

The experimental rats were divided into eight groups of six animals in each and were fed with single dose of plant extract/drug per day with the following concentrations.

Group I	:	Animals served as normal healthy controls
Group II	:	Untreated diabetic control rats
Group III	:	Diabetic rats were given leaf extract of <i>Apium graveolens</i> (200mg/Kg)
Group IV	:	Diabetic rats were given leaf extract of <i>Apium graveolens</i> (400mg/Kg)
Group V	:	Diabetic rats were given leaf extract of <i>Apium graveolens</i> (600mg/Kg)

Group VI	:	Diabetic rats were given leaf extract of <i>Cymbopogon flexuosus</i> (200mg/Kg)	by the action of vitamin C. Ascorbic acid is an antioxidant, since it protects the body against stress. Prevention of endogenous oxidation of cholesterol will reduce the concentration of LDL-C and thereby act as hypolipidemic agent (Venturi, 2007; Huang <i>et al.</i> , 2001). Thus this study shows the hypolipidemic activity of <i>Apium graveolens</i> and <i>Cymbopogon flexuosus</i> and warrants the isolation and purification of hypolipidemic components for further validation.
Group VII	:	Diabetic rats were given leaf extract of <i>Cymbopogon flexuosus</i> (400mg/Kg)	
Group VIII	:	Diabetic rats were given leaf extract of <i>Cymbopogon flexuosus</i> (600mg/Kg)	

Table 1. Hypo Lipidemic Effect of *Apium graveolens* and *Cymbopogon flexuosus* in Diabetic Rats

Groups	Total Cholesterol(mg/dl)	Triglyceride(mg/dl)	HDL(mg/dl)	LDL(mg/dl)	VLDL(mg/dl)
Group I	119.92 ± 6.27	84.92 ± 6.72	60.19 ± 3.36	34.68 ± 2.42	27.22 ± 1.85
Group II	223.62 ± 13.95	200.00 ± 14.17	39.10 ± 6.96	126.17 ± 1.79	47.03 ± 2.91
Group III	160.04 ± 5.89	140.12 ± 7.01	45.93 ± 4.20	61.18 ± 31.29	40.45 ± 2.29
Group IV	131.03 ± 7.86	116.20 ± 6.09	51.03 ± 4.12	45.09 ± 2.01	36.15 ± 2.03
Group V	123.39 ± 7.30	91.78 ± 6.62	56.34 ± 4.01	37.25 ± 1.91	31.03 ± 1.98
Group VI	151.65 ± 8.73	156.90 ± 6.53	49.00 ± 3.43	58.25 ± 2.02	39.73 ± 2.47
Group VII	133.46 ± 7.33	112.90 ± 5.50	54.31 ± 3.86	40.31 ± 2.03	34.36 ± 2.14
Group VIII	120.25 ± 5.95	87.29 ± 4.60	59.15 ± 3.71	35.10 ± 2.03	29.19 ± 1.93

Collection of serum

The animals were sacrificed by cervical dislocation under mild chloroform anesthesia. Blood was collected by cardiac puncture and serum was separated by centrifugation at 2500 rpm.

Determination of serum lipid level

The amount of total cholesterol (TC), Triacylglycerol (TG), High density lipoprotein (HDL-C) and Low density lipoprotein (LDL-C) in albino rats were assayed by enzymatic kit.

Statistical Evaluation

All results are expressed as Mean ± S.D. Statistical evaluation was done using one way analysis of variance (ANOVA) followed by students-t-test.

RESULTS

In this study, serum lipid profile of the treated animals total cholesterol (TC), Triglyceride (TG), low density lipoprotein (LDL) and Very low density lipoprotein (VLDL) levels were significantly reduced by different concentrations of 200, 400 and 600 mg/kg of plant extracts in dose dependent manner.

DISCUSSION

Elevated blood triglyceride and cholesterol, especially low density lipoprotein cholesterol (LDL-C) is a major risk factor in development of cardiovascular disease (Anderson, 1986). Lipid abnormalities under diabetic conditions may be due to the unlimited action of lipolytic hormones on the fat deposits. Under normal circumstances insulin activates the enzyme lipoprotein lipase which hydrolyses triacylglycerols. However, in diabetes, lipoprotein lipase is not activated due to insulin deficiency, resulting in hypertriglyceridemia (Al-shmaony *et al.*, 1994). *Apium graveolens* and *Cymbopogon flexuosus* treatment in diabetic treated rats showed antihyperlipidemic effect by restoring the serum lipid profile to near normal values. Lowering of cholesterol and raising of HDL cholesterol levels are the desirable biochemical states for prevention of atherosclerosis and ischemic conditions (Massing *et al.*, 2001). These extracts reduce the lipid activity

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