

EVALUATION OF HYPOCHOLESTERIMIC ACTIVITY OF SPHAG- A POLY HERBAL FORMULATION IN WISTAR ALBINO RATS

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Abstract

Hyperlipidemia is one of the greatest risk factors contributing to atherosclerosis and occurrence of coronary heart diseases. Hence hypolipidemic drugs are extensively used as prophylactic agents for preventing such atherosclerosis induced disorders. As synthetic drugs have lot of side effects, the focus on herbal drugs is increasing present day. SPHAG is a poly herbal formulation developed by the combination of aqueous extracts of plants *Solanum nigrum*, *Premna corymbosa*, *Holarrhena pubescens*, *Alstonia scholaris* and *Gymnema sylvestre*. The experiment was carried out in Wistar albino rats comprised of five groups such as Healthy Control, Disease Control, Drug Control, SPHAG Low Dose and SPHAG High Dose. The study was conducted for a period of 25 days by daily single dose of test extract through oral administration. At the end of the experiment, lipid profile, Biochemical profiles were evaluated. The study demonstrated the Hypolipidemic activity of SPHAG and the efficacy was dose dependent. The phytochemical studies showed the presence of phytoconstituents like alkaloids, flavonoids and phenols.

Keywords: Hypolipidemic activity, atherosclerosis, hypocholesteremia, herbal drugs

Introduction

Hyperlipidemia is a disorder of lipid metabolism manifested by elevation of serum concentrations of the various lipid and lipoprotein levels, which is the key risk factor for cardiovascular disorders (CVD) (1-2). CVD has been reported as the most common cause of death in developed and developing nations. The current antihyperlipidemic therapy includes principally statins and fibrates (3-4). Since, these synthetic drugs have been shown to have side effects, considerable interest has been shown for herbal drugs for treatment of lipid disorders. Plants have been a major source of drugs in Indian System of Medicine and other ancient systems in the world (5-6). The demand for medicinal plant is increasing in both developing and developed countries due to growing recognition on natural products being non narcotic having no side effects or less side effects and easily affordable (7-9).

SPHAG is a poly herbal formulation developed by the combination of aqueous extracts of plants *Solanum nigrum*, *Premna corymbosa*, *Holarrhena pubescens*, *Alstonia scholaris* and *Gymnema sylvestre*. The present study has been taken up to evaluate the hypocholesteremic activity of SPHAG in Wistar albino rats.

Materials and Methods:

Plant Collection and Identification:

The plant materials *Solanum nigrum* Leaf, *Premna corymbosa* Leaf, *Holarrhena pubescens* bark, *Alstonia scholaris* Leaf and *Gymnema sylvestre* Leaf were procured from the local drug supplier of the institute and these plants were authenticated in the Pharmacy Division of NRIP, Cheruthuruthy.

Plant product SPHAG

SPHAG is a polyherbal formulation made out of the combination of aqueous extracts of plants *Solanum nigrum* Leaf, *Premna corymbosa* Leaf, *Holarrhena pubescens* bark, *Alstonia scholaris* Leaf and *Gymnema sylvestre* Leaf at equal proportion. The aqueous extract was prepared as per the Ayurvedic Pharmacopoeia of India. The product was stored in 4 -8^o C for the purpose of animal experiment.

Chemicals and Reagents:

Chemicals of AR grade from SRL India and Biochemical kits from Transasia Ltd. and Bayer India Ltd were used.

Phytochemical Analysis:

The phyto-constituents analysis was carried out for the aqueous extract of each plant in the SPHAG formulation. The standard laboratory protocol was used for the estimation (10-14).

Animal Experimentation:

Wistar albino rats were procured from the Small Animal Breeding Station, Veterinary and Animal Sciences University, (Government of Kerala), Thrissur, India. Animals were acclimatized to the standard laboratory condition before starting the experiment. The animal studies were carried out in the National Research Institute for Panchakarma, Cheruthuruthy as per CPCSEA guidelines and with the approval of Institutional Animal Ethical Committee.

Methodology:

Six to seven months old Wistar albino rats of both sexes weighing 150-200 gm were used for the experiment. The animals were fed with standard laboratory pellet chow (Amrit, Bangalore) and given water *ad libitum*. The animals were randomly divided into five groups of six animals each and the standard protocol was used for the evaluation of hypocholesterimic activity (15-16).

Group-I is Healthy Control which received single daily dose of distilled water throughout the study period i.e. 25 days.

Group-II is Disease Control group which was treated with oral administration of Cholesterol (1000mg /kg. bwt.) on all 25 days.

Group-III is Extract Control, which was treated with single daily dose of SPHAG at 800 mg/kg.bwt throughout the study period.

Group IV is Low Dose treatment group, which received daily single dose of SPHAG at 400 mg/kg.bwt. and Cholesterol (1000 mg/kg.bwt.)

Group V is High Dose treatment group, which received daily single dose of SPHAG at 800 mg/kg.bwt and Cholesterol (1000mg/kg.bwt.). On twenty-fifth day of the experiment, rats were anaesthetized by mild chloroform anaesthesia and blood was collected after keeping the animals for 12 hours fasting. Biochemical parameters including Cholesterol, Triglycerides, LDL, liver functions parameters including Serum glutamate oxaloacetate transaminase, Serum glutamate pyruvate transaminase and Alkaline phosphatase were evaluated (17-21).

Results:

The phytochemical analysis of plant extracts in the SPHAG formulation showed the presence of phenols, alkaloids and flavonoids (Table 1).

The present study demonstrated hypocholesteremic activity of SPHAG in the wistar albino rats and efficacy was found to be significant. The oral administration of SPHAG for a period of 25 days showed the significant changes in the Biochemical parameters.

The evaluation of Cholesterol, triglycerides, and LDL levels were found to be elevated two fold in the Disease Control Group when compared with the Healthy Control Group. The Extract Control Group showed the normal lipid profile status when compared with the Healthy Control Group. There was a significant prevention in the elevation of lipid profile among the test groups i.e. SPHAG Treated (Low Dose and High Dose) when compared with the Disease Control Group.

Similarly the liver marker enzyme profile SGOT, SGPT and Alkaline Phosphatase levels were found to be significantly increased in the Disease Control Group over the Healthy Control Group. These liver enzyme levels in the extract control and test groups were found to be little higher than the Healthy Control Group but the levels were well within the reference range of healthy animals.

Table 1. Phytochemical characteristics of study plants

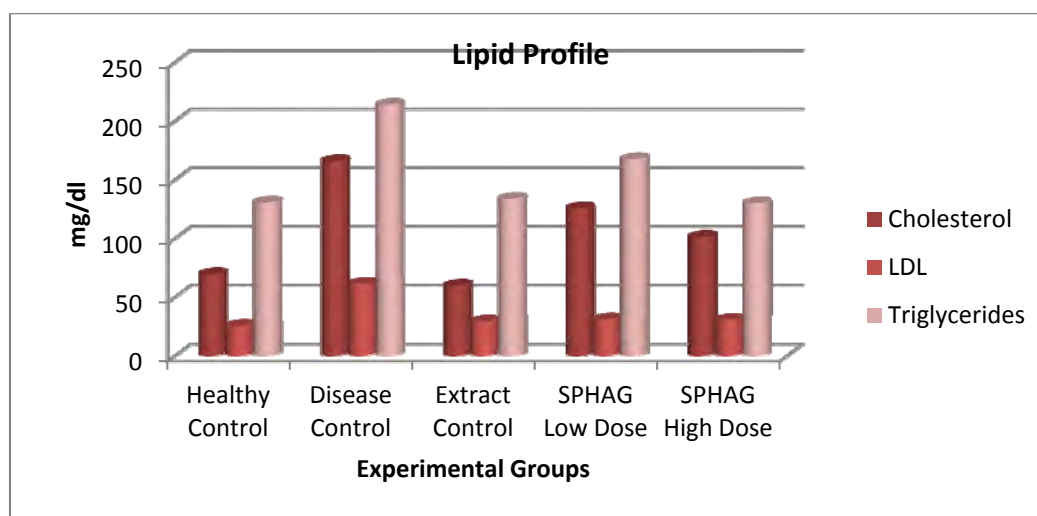
Phytochemical tests	Plant Ingredients of SPHAG				
	<i>Solanum nigrum</i>	<i>Premna corymbosa</i>	<i>Holarrhena pubescens</i>	<i>Alstonia scholaris</i>	<i>Gymnema sylvestre</i>
Alkaloids	-	-	+	+	+
Flavonoids	+	+	+	-	-
Saponins	+	+	-	+	+
Carbohydrates	-	+	+	-	+
Proteins	+	+	+	-	+
Phenols	+	-	+	+	+
Tannins	-	-	+	+	+
Cardioglycosides	-	-	-	+	-
Steroids	+	+	-	+	+

+ Present - Absent

Table 2. Lipid profile in SPHAG treated experimental animals

Experiment Groups	Lipid Profile		
	Cholesterol (mg/dl)	Low Density Lipoprotein (mg/dl)	Triglycerides (mg/dl)
Healthy Control	69.40 ± 20.26	25.60 ± 7.70	130.50 ± 16.30
Disease Control	165.70 ± 28.90*	61.20 ± 11.40*	213.66 ± 43.20**
Extract Control	59.61 ± 10.50*	29.20 ± 4.80	133.60 ± 12.55*
SPHAG Low Dose (400mg/kg.bwt)	125.50 ± 13.80*	31.0 ± 5.90*	167.40 ± 21.30**
SPHAG High Dose (800mg/kg.bwt)	101.20 ± 21.70*	30.50 ± 5.40	129.80 ± 29.40*

Values are expressed as Mean ± SD. n=6 animals in each group. * p <0.05, ** p<0.01 when compared to Disease Control.

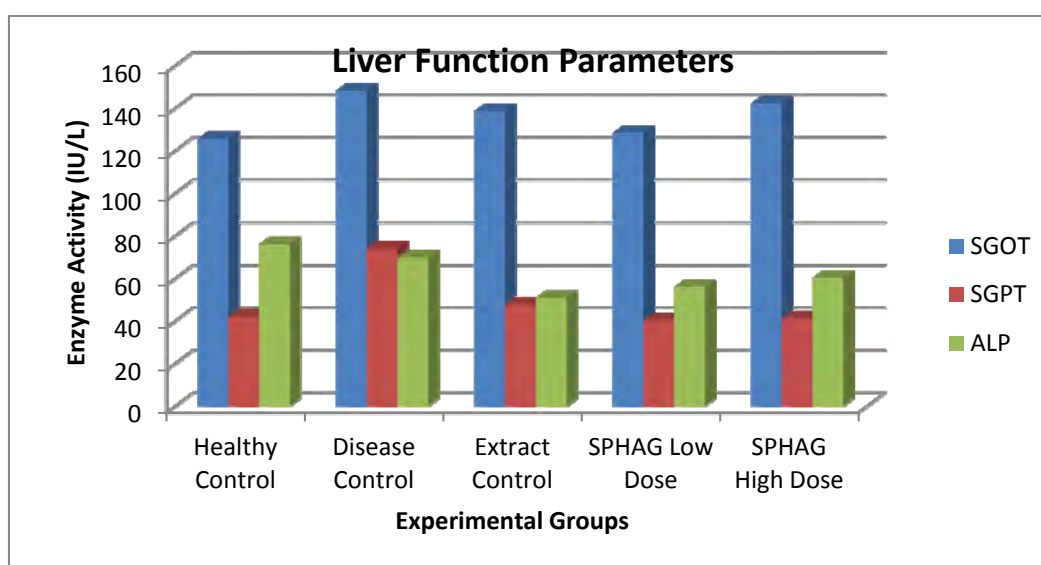


Graph 1. Comparison of lipid profile status among experimental animals treated with study drug SPHAG

Table 3. Levels of Liver Function Parameters in SPHAG treated experimental animals

Experiment Groups	Liver Function Parameters		
	Serum Glutamate Oxaoloacetate Transaminase (SGOT) (IU/L)	Serum Glutamate Pyruvate Transaminase (SGPT) (IU/L)	Alkaline Phosphatase (ALP) (IU/L)
Healthy Control	125.70 ± 33.70	42.20 ± 11.70	76.20 ± 10.80
Disease Control	148.30 ± 32.60*	74.30 ± 18.30*	69.80 ± 5.80
Extract Control	138.70 ± 25.90	47.80 ± 13.80	51.0 ± 10.80*
SPHAG Low Dose (400mg/kg.bwt)	128.40 ± 31.60*	40.40 ± 8.40*	56.0 ± 15.20*
SPHAG High Dose (800mg/kg.bwt)	142.30 ± 36.80*	41.30 ± 6.28**	60.40 ± 12.20*

Values are expressed as Mean ± SD. n=6 animals in each group. * p <0.05, ** p<0.01 when compared to Disease Control



Graph 2. Comparison of liver marker enzyme profile among experimental animals treated with study drug SPHAG

Discussion

With the urbanization and changed life-style there has been an alarming rise in the incidence and deaths caused by Coronary Heart Disease (CHD). The increased serum total cholesterol concentration and low density lipoprotein cholesterol concentration, decreased high density lipoproteins and some instances elevated triglyceride concentrations are the major risk factors. So, an important aim of the treatment of CHD is to improve lipid profiles (22-25). In view of this, the research for hypolipidemic drug is assuming considerable importance especially on herbal products for the prevention and treatment of hypercholesterolemia.

The present study was undertaken to investigate the possible hypocholesterimic effect of SPHAG- a formulation developed in the Institute. The formulation contains the medicinal plants having vast therapeutic potential as per the traditional Indian medicine system.

The present study showed that simultaneous administration of the SPHAG along with cholesterol feeding brought about significant hypocholesterimic effect. The SPHAG treated groups showed the prevention of elevation of cholesterol, triglyceride and LDL level in the test groups. At the prescribed dosage, the liver function parameters were normal and it proved that the test extract is safer. The phytochemical analysis showed the presence of alkaloids, flavonoids, saponins and steroids in the SPHAG and these are expected for its bio potency by acting individually and synergistically.

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Conflicts of Interest: Nil

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