RESEARCH ARTICLE

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Hypolipidemic Activity of *Viscum articulatum* Extracts in Albino Mice

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Abstract: To evaluate hypolipidemic activity of crude extracts such as Petroleum ether, Chloroform, Ethanol and Purified water extract of *Viscum articulatum* in albino mice and validate its traditional claim. Lipid profile such as total cholesterol, triglyceride, low density lipoprotein and high density lipoprotein in blood serum of albino mice was analyzed using Autopak Kit. Change in body weight of albino mice during treatment was observed statistically. Chloroform Extract of *Viscum articulatum* (CEVA) at a dose of 200 mg/kg significantly reduces mean body weight, total cholesterol, triglyceride and low density lipoprotein level in blood serum of albino mice and increases high density lipoprotein level in blood serum of albino mice as compared to control. It was observed that chloroform extract of *Viscum articulatum* (CEVA) found more significant to exert the hypolipidemic effect.

INTRODUCTION

Cardiovascular diseases with an incidence of approximately 50% are the main cause of death in most of the advanced countries. [1] The disease burden contributed by cardiovascular diseases has been increasing in the developing world also. The World Health Organization (WHO) estimates that every year 12 million people worldwide die from cardiovascular diseases, with most of them being from the developing world. [2] Most people would benefit from lowering their blood pressure and cholesterol level. The underlying primary cause of cardiovascular disease is believed to be atherosclerosis, a progressive multifactorial disease of the arterial wall. [3, 4] Central to the pathogenesis of atherosclerosis is deposition of cholesterol in the arterial wall. [5] Nearly all lipoproteins are involved in this process including cholesterol carried by very low-density lipoproteins (VLDL), remnant lipoproteins and low-density lipoproteins (LDL). The most important study done to demonstrate that blood cholesterol is a risk factor for coronary artery disease (CAD) is the Framingham study initiated and operated by the National Heart, Lung and Blood institute, USA. Animal studies and many large, randomized double blind studies in human beings prove beyond doubt, the cause and effect relationship between hypercholesterolemia and morbidity and mortality from CAD. [6, 7]

Hypolipidemic therapy is highly effective in reducing the risk as has been demonstrated dramatically in the Scandinavian Simvastatin Survival Study (4S). [8] In addition, the past decade saw a series of remarkable studies that suggested oxidative systems; particularly oxidation of LDL is a risk factor and plays a role at several steps of atherosclerosis. [9, 10] A decrease in oxidative stress and protection of LDL from oxidation might therefore be a strategy with great promise for prevention of atherosclerosis associated cardiovascular disease. [11]

Plant *Viscum articulatum* Burm. f. (Loranthaceae) is commonly known as Pudu. In Ayurveda the plant is used as bitter, acrid, cooling, sweetish, alexipharmic, aphrodisiac, alterative and useful in kapha, vata, diseases of the blood, ulcers, epilepsy and biliousness. [12] In Chinese medicine the plant c Burm. f. has commonly been used as a curative for a number of ailments such as hemorrhage, pleurisy, gout, heart disease, epilepsy, arthritis and hypertension. [13, 14]

MATERIALS AND METHODS

Experimental Animals

Swiss albino mice (30 - 40 g) were required for the evaluation of hypolipidemic activity and were housed in groups of six under standard laboratory conditions of temperature (25±2°C) and 12/12 hr light/dark cycle. Animals had free access to standard pellet diet and water ad libitum. The Institutional Animals Ethics Committee approved the protocol vide no. NIB/ IAEC/ 09-10/ 87 dated 15/01/2010.

Preparation of Standard Drug and Extract Solution

Different extracts of *Viscum aticulatum* was prepared using Petroleum Ether, Chloroform, Ethanol and water by using Soxhlet Extraction method. Suspensions of all crude extract were prepared using 0.2% w/v gum acacia in distilled water. Each extract 200 mg were triturated with 0.2% w/v gum acacia powder in distilled water then added the distilled water to get the final volume of suspension. The suspension of each extract was prepared as when required separately stored in air tight containers at 25°C and labeled properly. The standard drug chosen was Lovastatin. Tablet of Lovastatin purchased from market (Cipla Ltd.) for comparison of hypolipidemic activity with all crude extracts. Gum acacia 0.2% w/v used for the preparation of standard drug suspension at a dose of 7.2 mg/kg.

Acute Toxicity Study (LD50 Determination) of Different Crude Extracts

Acute oral toxicity study was performed as per OECD 423 guideline. Extracts was administered up to the maximum dose of 2000 mg/kg and animals were observed for mortality.

In-vivo Assessment of Hypolipidemic Activity

The hypolipidemic activity of dried whole plant of the hemiparasite, *Viscum articulatum* Burm.f was performed in atherogenic diet induced hyperlipidemic model in mice. [15]

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Table 1: Mean Body Weight of Mice in Different *Viscum articulatum* Extract Treated Groups

S. No.	Groups	Mean Body Weight (g)		
		Initial	Day 30	Day 45
1	Normal	34.25±2.24	36.45±2.41	37.28±1.98
2	Control	34.38±2.10	36.30±2.41	38.60±2.80
3	Standard	34.60±2.58	24.42±2.49*	21.85±1.84*
4	PEVA	34.10±1.61	34.22±2.15	36.54±2.49
5	CEVA	33.48±2.67	29.89±1.49*	25.42±2.12*
6	EEVA	34.70±2.61	33.49±2.17	34.72±2.46
7	WEVA	33.10±1.81	34.62±2.83	35.84±1.43

Values are mean ± SEM; n=6 in each group. *p<0.05 as compared to control group (Dunnet's test)

Table 2: Lipid Profile (mg/dl) of Mice in Different *Viscum articulatum* Extract Treated Groups

S. No.	Groups	TC (mg/dl)	TG (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	AI
1	Normal	97.14±2.89	41.41±1.89	40.12±2.15	62.30±2.24	1.42
2	Control	177.18±4.98	124.21±3.98	35.85±2.47	166.17±5.21	3.94
3	Standard	**151.14±3.01***	**79.41±3.47***	**49.21±3.51***	**117.90±4.20***	**2.88**
4	PEVA	179.24±3.85	104.84±2.35	37.13±1.14	163.47±3.47	3.82
5	CEVA	**159.14±2.898***	**85.10±2.48***	**48.94±2.82***	**127.2±3.12***	**2.25**
6	EEVA	168.26±3.48	102.29±2.08	45.48±2.51	143.23±3.58	2.70
7	WEVA	178.20±3.64	101.26±3.47	42.89±2.84	155.56±2.98	3.15

Values are mean ± SEM; n=6 in each group. *p<0.05 as compared to control group (Dunnet's test)

1. Group I: Normal, Mice fed on normal feed + 0.2% w/v Gum acacia + Water *ad libitum*.
2. Group II: Control, Mice fed on atherogenic diet + Water *ad libitum*.
3. Group III: Standard, Mice fed on atherogenic diet + lovastatin 7.2 mg/kg/day/p.o.+ Water *ad libitum*.
4. Group IV: Mice fed on atherogenic diet + PEVA 200 mg/kg/day/p.o + Water *ad libitum*. PEVA (Petroleum ether extract of *Viscum articulatum*)
5. Group V: Mice fed on atherogenic diet + CEVA 200 mg/kg/day/p.o.+ Water *ad libitum*. CEVA (Chloroform extract of *Viscum articulatum*)
6. Group VI: Mice fed on atherogenic diet + EEVA 200 mg/kg/day/p.o.+ Water *ad libitum*. EEVA (Ethanolic extract of *Viscum articulatum*)
7. Group VII: Mice fed on atherogenic diet + WEVA 200 mg/kg/day/p.o.+ Water *ad libitum*. WEVA (Water extract of *Viscum articulatum*)

Observation

Before starting the feeding of normal diet and atherogenic diet and treatment to respective animal initial body weight of animals from each group was recorded. All the treatment was continued for 45 days. The animals were monitored closely everyday and weighed every week. At the end of treatment of mice (after 45 days) were fasted overnight and Blood was drawn from retro orbital plexus, serum separated and stored in refrigerator until assay. The serum concentration of total cholesterol, total triglycerides, and total HDL cholesterol were estimated by using Autopak kit and statistically analyzed.

Statistical Analysis

The data were presented as mean ± SEM. The statistical significance between the groups has been tested by ANOVA followed by Dunnett's test. A probability value less than 0.05 were considered as significant.

RESULTS AND DISCUSSION

Effect on Body Weight

Table 1 and Figure 1 showed the mean body weights of mice in normal, control, standard drug and different *Viscum articulatum* extracts (Petroleum ether, Chloroform, ethanol and water extract) treated groups at different interval. It is observed that all the treatment with standard and extracts significantly reduced the body weight of mice as compared to control group. Standard drug and chloroform extract groups significantly decreased in their body weight 21.85±1.84, 25.42±2.12 respectively. Standard drug and chloroform extract of *Viscum articulatum* was found maximum weight reducing activity as compared to other groups.

Effect on Serum Total Cholesterol, Triglyceride, Lipoprotein Level and Atherogenic Index

Table 2 and Figure 2 represents the serum concentration of total cholesterol, triglyceride, low density lipoprotein, high density lipoprotein and atherogenic index (Figure 3) of all normal, control, standard and *Viscum articulatum* extracts (Petroleum ether, chloroform, ethanol and water extract) treated groups. Chloroform extract of *Viscum articulatum* (CEVA) at dose of 200 mg/kg decreases total cholesterol, triglyceride and low density lipoprotein level and increases high density lipoprotein level in blood serum of albino mice as compared to control group and other extracts. The atherogenic indices for standard (lovastatin treated) and Chloroform extract of *Viscum articulatum* (CEVA) were 2.88 and 2.25 respectively. These observations indicate the significant reduction in atherogenic index by Chloroform extract of *Viscum articulatum* (CEVA) at a dose of 200 mg/kg as compared to the standard compound lovastatin and other *Viscum artuculatum* extracts.

CONCLUSION

The chloroform extract of *Viscum articulatum* (CEVA) at a

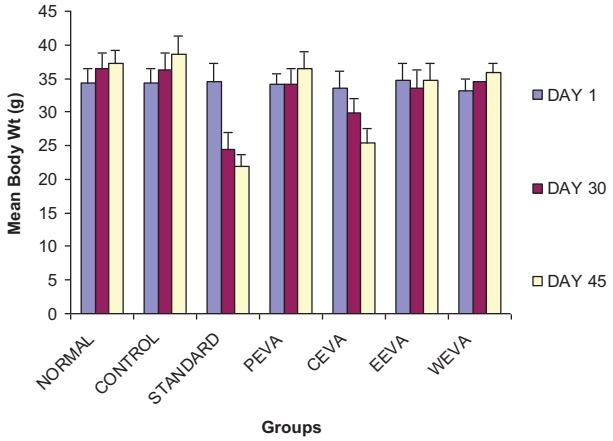

Figure 1: Mean body weight of mice in different *Viscum articulatum* extract treated groups

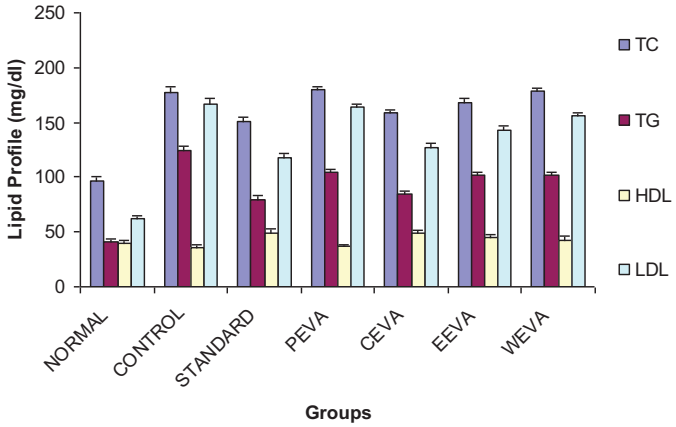

Figure 2: Mean of Lipid profile (mg/dl) of mice fed with different *Viscum articulatum* extract treated groups

dose of 200 mg/kg was found to more significant to exert hypolipidemic effect and lowered atherogenic index as compared to control and other *Viscum articulatum* extract treated groups

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