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A Study on Anti-Dyslipidemic Activities (Lipid Profile) of Extracts of Gloriosasuperba, Valerian Wallichi and Odenlandiacorymbosa

Authors
Kislay Awasthi[1], Dr R.C. Gupta[2], Dr Abbas Ali Mahdi[3]
[1]NIMS University, Jaipur-303121(Raj)
[2]Prof & Head, Dept. of Biochemistry, NIMS University, Jaipur
[3]Prof & Head, Dept. of Biochemistry, KGMC – Lucknow- U.P
Corresponding Author
Dr Abbas Ali Mahdi
Prof & Head, Dept. of Biochemistry, KGMC – Lucknow-U.P.
Email: *mahdiaa@rediffmail.com*

Abstract
Objective: *To investigate the lipid profile of rats from three plants – Gloriosasuperba (Bachnag), Valerian wallichi (Tagar) and Odenlandiacorymbosa (Daman pappad).*
Methods: *The study was carried out in rats. Dyslipidemia was induced by feeding them fructose-rich high fat diet (F-HFD). Effect of active compounds was studied and compared with control animals. Healthy male adult rats of Wistar strain (200-225 g) were obtained All the rats were initially maintained on Hindustan Lever Food Pellets diet and water ad libitium. The cages were kept in a temperature and humidity controlled room with a 12-hr light–dark cycle. The lipid parameters were measured. Group 1- Control rats; Group 2- Rats kept on Fructose-rich high fat diet; Group 3- Rats kept on F-HFD and treated with plant extract Gloriosasuperba, (dose 250 mg/kg b.w); Group 4- Rats kept on F-HFD and treated with plant extract Valerian wallichi, (dose; 250 mg/kg b.w.); Group 5 -Rats kept on F-HFD and treated with plant extract Odenlandiacorymbosa , (dose; 250 mg/kg b.w); Group 6- Rats kept on F-HFD and treated with active compound from Valerian wallichi (dose mg/kg b.w.).*
Results: *Analysis of variance showed that there was no significant ($p>0.05$) difference in glucose, gHb and HDL-C among the groups. The other lipid parameters were significantly ($p<0.5$) different among the groups. The post-hoc tests showed that S.cholesterol was significantly different between Group 1 & Group 3 ($p=0.03$), Group 1 & Group 5 ($p=0.0001$) and Group 1 & Group 6 ($p=0.0001$). A significant difference in S. cholesterol was also noted between Group 2 and Group 5 & Group 6. S. TG, VLDL and free fatty acid were significantly ($p<0.05$) between Group 1 and Group 6.*
Conclusion: *We concluded that the herbal plants tested possess anti-dyslipidemic activities and this encourages further investigation in this field.*
Keywords: *Anti-dyslipidemic, Gloriosasuperba, Valerian wallichi, Odenlandiacorymbosa.*

INTRODUCTION

Dyslipidemia is a common public health problem. The term dyslipidemia means abnormal lipid levels in plasma. This can be consequent to excess production, defective transport, delayed peripheral clearance, reduced utilization of lipoproteins or

their intermediates or a combination of these abnormalities. The causes responsible for such lipid disorders could be primary or secondary to diabetes mellitus, nephrotic syndrome and hypothyroidism etc (Shah, 2008). Dyslipidemia generally manifests as elevation of total cholesterol (T-C), triglyceride (TG) and low-density lipoprotein cholesterol (LDL-C) concentrations, and a decrease in the highdensity lipoprotein cholesterol (HDL-C) concentration in plasma (Basak et al, 2013). Overall, dyslipidemia is defined by T-C, LDL-C, TG, apolipoprotein B and lipoprotein (a) levels in the upper 90th percentile or HDL-C and apolipoprotein A1 levels below the 10th percentile of general population (Bostom et al, 1996). Dyslipidemia covers a broad spectrum of lipid abnormalities, but T-C,LDL-C and HDL-C have received the maximum attention. A number of lipid lowering regimens are available in modern medicine to treat dyslipidemia. The current therapies used for controlling dyslipidemia include fibrates, statins and bile acidbinding resins. The statins are the most widely used out of these. However, these drugs also cause a number of undesirable side effects after long-term consumption. Plants have been a major source of drugs in Indian system of medicine and other ancient systems in the world. Earliest description of curative properties of medicinal plants is found in Rigaveda. CharakaSamhita and SushrutaSamhita give extensive description of various medicinal herbs. Information on medicinal plants in India has been systematically organized. Since plant drugs and herbal formulation are generally considered to be less toxic, free from side effects and cost effective as compared to the synthetic ones, they are an attractive option for development of new and potent drugs. These natural products are available in abundance and can provide efficacious medicinal preparations. Some of the medicinal plants may be useful for treatment of dyslipidemia also (Eddouks et al, 2002) but literature on this aspect is scanty. Gloriosasuperba, Valerian wallichi and Odenlandiacorymbosaare plants having diverse pharmacological properties but their anti-dyslipidemic activity is yet to be explored in controlled and well-designed studies.

The aim of this study was to investigate the lipid profile of rats from three plants – Gloriosasuperba (Bachnag), Valerian wallichi (Tagar) and Odenlandiacorymbosa (Daman pappad).

MATERIAL AND METHODS

The study was carried out in rats. Dyslipidemia was induced by feeding them fructose-rich high fat diet (F-HFD). Effect of active compounds was studied and compared with control animals. Healthy male adult rats of Wistar strain (200-225 g) were obtained from the animal house of King George's Medical University, Lucknow (U.P.) and were used for the study after obtaining permission from the Animal Ethics Committee of University. All the rats were initially maintained on Hindustan Lever Food Pellets diet and water ad libitium. The cages were kept in a temperature and humidity controlled room with a 12-hr light–dark cycle.

Preparation of plant extracts: Authenticated samples of Gloriosasuperba, Valerian wallichi and Odenlandiacorymbosa was procured and alcoholic extracts were prepared as described below:

Isolation of active compounds: Active compounds were isolated and purified. Their characterization was done by different spectral techniques viz. NMR, IR and Mass spectroscopy.

Assessment of Diabetes-related analytes: The blood level of Glucose and Glycosylated haemoglobin (HbA1C) were measured.

Assessment of Dyslipidemia: The blood level of Free Fatty Acids, Total Cholesterol (T-C), Phospholipids (PL), Triglyceride (TG), Very Low Density Lipoprotein Cholesterol (VLDL-C), Low Density Lipoprotein Cholesterol (LDL-C), High Density Lipoprotein Cholesterol (HDL-C), Lecithin Cholesterol Acyl Transferase (LCAT) and Post Heparin Lipolytic Activity (PHLA) were measured.

Treatment schedule: The animals were divided in six groups of five rats each:

Group 1- Control rats (Kept on normal pellet diet); Group 2- Rats kept on Fructose-rich high

fat diet (F-HFD); Group 3- Rats kept on F-HFD and treated with plant extract Gloriosasuperba, (dose 250 mg/kg b.w); Group 4- Rats kept on F-HFD and treated with plant extract Valerian wallichi, (dose; 250 mg/kg b.w.); Group 5 -Rats kept on F-HFD and treated with plant extract Odenlandiacorymbosa , (dose; 250 mg/kg b.w); Group 6- Rats kept on F-HFD and treated with active compound from Valerian wallichi (dose mg/kg b.w.).

Statistical analysis

The results are presented in mean±SE. The one way analysis of variance was used to compare the lipid levels among the groups. Tukey's post-hoc tests was used for pair-wise comparisons. The p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

Analysis of variance showed that there was no significant (p>0.05) difference in glucose, gHb and HDL-C among the groups. The other lipid parameters were significantly (p<0.5) different among the groups (Table-1).

The post-hoc tests showed that S.cholesterol was significantly different between Group 1 & Group 3 (p=0.03), Group 1 & Group 5 (p=0.0001) and Group 1 & Group 6 (p=0.0001). A significant difference in S. cholesterol was also noted between Group 2 and Group 5 & Group 6. S. TG, VLDL and free fatty acid were significantly (p<0.05) between Group 1 and Group 6 (Table-2).

Table-1: Comparison of lipid profile among the groups

Lipid profile	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	p-value[1]
Glucose (mg/dl)	116.80±9.22	106.20±4.77	99.60±3.70	114.20±9.49	99.60±9.40	110.60±13.25	0.64
gHb (%)	4.58±0.41	4.14±0.12	4.08±0.17	4.40±0.10	4.20±0.37	4.20±1.22	0.98
S.cholesterol (mg/dl)	128.40±9.11[a,b,c]	122.40±8.02	92.00±7.32 [a]	125.60±8.42	71.00±4.82 [b]	63.00±4.84 [c]	0.0001*
S.TG (mg/dl)	108.80±8.21	88.60±5.66	69.20±5.87	97.00±5.87	56.40±2.24	49.20±5.48	0.0001*
HDL-C (mg/dl)	40.40±3.42	32.80±2.08	31.20±3.05	39.00±1.00	30.20±3.15	28.60±4.29	0.06
LDL-C (mg/dl)	101.00±10.44	78.40±6.23	67.20±6.23	90.40±9.00	61.00±2.55	81.60±7.67	0.008*
VLDL	58.80±2.01	48.40±4.55	43.20±4.10	58.80±5.07	42.60±7.97	34.60±4.76	0.01*
Free Fatty acid	93.20±4.48	87.20±4.97	74.20±4.39	90.20±4.04	63.00±7.17	64.00±9.27	0.003*
Phospholipids (mg/dl)	133.60±11.35	105.60±8.16	95.60±6.65	124.20±12.66	80.20±1.46	105.00±11.40	0.007*
LCAT(µmol)	48.60±4.01	54.40±3.58	58.00±3.37	49.40±4.97	63.60±2.42	41.20±4.35	0.008*
PHLA (µmol)	21.40±2.73	18.00±2.09	14.40±1.28	18.40±1.96	11.00±0.83	19.80±1.93	0.009*

[1]ANOVA test

Table-2: Post hoc tests between the groups (Only significant difference is shown)

Dependent Variable	Group	Group	p-value
S.cholesterol	Group 1	Group 3	0.02
		Group 5	0.0001
		Group 6	0.0001
	Group 2	Group 5	0.0001
		Group 6	0.0001
	Group 3	Group 4	0.04
	Group 4	Group 5	0.0001
		Group 6	0.0001
S.Triglycerides	Group 1	Group 3	0.0001
		Group 5	0.0001
		Group 6	0.0001
	Group 2	Group 5	0.01
		Group 6	0.0001
	Group 3	Group 4	0.03
	Group 4	Group 5	0.0001
		Group 6	0.0001

LDL- C	Group 1	Group 3	0.03
		Group 5	0.01
VLDL	Group 1	Group 6	0.03
Free Fatty acid	Group 1	Group 5	0.02
		Group 6	0.02
	Group 6	Group 1	0.02
Phospholipids	Group 1	Group 5	0.01
	Group 4	Group 5	0.03
	Group 5	Group 1	0.01
	Group 5	Group 6	0.01
PHLA	Group 1	Group 5	0.01
	Group 5	Group 6	0.03

DISCUSSION

Currently available treatments for dyslipidemia in modern medicine, e.g. fibrates, statins or bile acid sequestrates, correct lipid abnormalities to an appreciable extent but also have several adverse effects (Chattopadhyaya et al, 1996).Therefore, there is a need to develop safe and effective treatment modalities for dyslipidemia. Medicinal plants play an important role in the treatment of dyslipidemia, especially due to their lesser toxicity, lesser side effects and cost effectiveness. In this regard, plants provide the best option for search of safe and effective medications. Therefore, there is a need to research and develop new plant products with lipid-lowering, and antioxidant activities. We had selected three plants namely Gloriosasuperba, Valerian wallichi and Odenlandiacorymbosa for a detailed investigation of their anti-dyslipidemic activities. The study found that there was significant difference in treated rats from all the three extracts than controls. The results of this study showed the effectiveness of the extract of Gloriosasuperba, Valerian wallichi and Odenlandiacorymbosa in modifying the dyslipidemia resulting from administering high cholesterol diets to the rats.

Previous research found one of the starting stages of atherosclerosis was the entry of low-density lipoproteins into artery walls. This caused accumulation, modification, and oxidation of low-density lipoproteins, which prevented the adhesion, migration, and differentiation of monocytes and caused inflammation (David and Micheal, 2000). Moreover, researchers stated glycosylation and all events that increased oxidative shocks were important factors (Katsuyuki et al, 2006; Clermont et al, 2005). Furthermore, previous studies showed that atherosclerosis was an inflammatory process. Inflammation, especially chronic inflammation, is one of the common complications of many diseases and weakens the immune system of the body. The inflammation process, in addition to creating infection problems, delays the healing process in the related diseases (Faggiotto et al, 2004). Rhizome roots of valerian contain flavonoids, amidon, tannin, glucose, various salts, essential oil, valerinic acids, formic acid, acetic acid, and propionic acid. Studies on the total plant fractions showed the flavonoids in valerian, due to their special spatial shape, accelerate intestinal absorption, possess significant anti-inflammatory effects, increase suppression of prostaglandins, inhibit 5-lipooxygenase and, thus, normalize concentrations of biochemical factors in blood serum (Shahidi and Naczk, 2004).

Moreover, people with hyperlipidemia require more antioxidants and their blood lipids can be reduced by adding antioxidants to their diets or through administering drugs. Phytochemical studies have shown valerian is rich in flavonoids that are mainly in the form of flavanols and possess antioxidant properties (Solati and Sanaguye, 2008) and, thus, reduce lipid peroxidation and oxidative destruction of blood vessels.

CONCLUSION

We concluded that the herbal plants tested possess anti-dyslipidemic activities and this encourages further investigation in this field.

REFERENCES

1. Shah SN.API Text book of Medicine.8thed. Vol 2. Mumbai: The Association of Physicians of India, 2008; 954-955.
2. Basak RC, Chatterjee M, Sarma P. An overview on management of diabetic dyslipidemia. J Diabetes Endocrinol. 2013;4(3):27-36.
3. Bostom AG, Cupples LA, Jenner JL, Ordovas JM, Seman LJ, Wilson PW, et al. Elevated plasma lipoprotein (a) and coronary heart disease in men aged 55 years and younger: a prospective study. JAMA 1996; 276(7):544-8.
4. Eddouks M, Maghrani M, Lemhadri A, Ouahidi ML, Jouad H. Ethnopharmacological survey of medicinal plants used for the treatment of diabetes mellitus, hypertension and cardiac diseases in the south-east region of Morocco (Tafilalet). J Ethnopharmacol. 2002; 82(2):97-103.
5. Chattopadhyaya R, Pathak D, Jindal DP. Antihyperlipidemic agents: A review. Indian drugs. 1996;33(3):85-97
6. David LN, Micheal MC. Lehninger principle of biochemistry .Phiadelphia: Sunders company.2000;770-816.
7. Katsuyuki N, Takamitsu N, Akira T. The oxidative modification hypothesis of artherosclolerosis:the comparison of atherogenic effects on oxidized LDL and remnant lipoproteins in plasma. Clinicachimioca Acta.2006;367:36-47.
8. Clermont P, Creager M, Losodo D, Gregory K, Dzau V. Atherosclerosis: recent discover s and novel hypoyheses. Circulation.2005;112: 3348-3353.
9. Faggiotto A, Ross R, Harker L. Studies of hypercholesterolemia in the nonhuman primate ,In:changes that lead of fatty streak formation.Artriosclerosis.2004;4:323-340.
10. Shahidi F and Naczk M. Phenolics in food and nutraceuticals (Boca Raton, Florida, USA: CRC Press,).2004; pp. 313–314 ISBN 1-58716-138-9.
11. Solati J, SanaguyeMotlagh H. Anxiolytic effects of Valepotriates extracted from Valerianaofficinalis L. in rats. Journal of Qazvin Univ Med Sci. 2008; 12(3): 63-67.