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Short Communication

Study on hypolipidemic activity of flowers of A*llamanda neriifolia hook*. in atrovastain induced rats

R. Sumathi* and M. Chitra**

* Dept of Biochemistry, R.A. College for Women, Thiruvarur, Tamilnadu, India
**Dept of Biochemistry, Agricultural College and Research Institute, Thanjavur– 613001, Tamilnadu, India

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ABSTRACT

Hyperlipidemia is a key risk factor for cardiovascular disorders (CVD). Since synthetic drugs have shown side clinical importance of herbal drugs in the treatment of CVD has considerable attention in recent years. *Allamanda neriifolia Hook*, (Apocynaceae) is an ornamental plant and is traditionally used as a hyperlipidemic drug. It is traditionally used for its various properties and in the present study, methanol extracts of flowers of *Allamanda neriifolia* has been screened for its hypolipidemic activity by inducing hyperlipidemia with the help of atherogenic diet in Wistar albino rats. The biochemical parameters such as total cholesterol, TG, LDL, VLDL, and HDL cholesterol & phospholipids were studied in the experimental animals. Methanol extract of *Allamanda neriifolia showed* a significant hypolipidemic effects by lowering the serum levels of biochemical parameters that was similar effect to the standard drug, Atorvastatin. Methanol extract of *Allamanda neriifolia* exhibits a significant atherogenic index and percentage of protection against hyperlipidemia.

Key Words: *Allamanda neriifolia Hook*, Methanol extract, Atorvastatin, Hyperlipidemia.

INTRODUCTION

Cardiovascular disorders (CVD) are the most common cause of death in developed and developing nations [1; 2]. Atherosclerosis increases the risk of heart disease, stroke and other vascular disease. Hypercholesterolemia and hypertriglyceridemia are independent risk factors that alone or together can accelerate the development of atherosclerosis and progression of atherosclerotic lesion [3]. Presently, the medicinal fraternity has increasingly started using plants to overcome various illness and suffering mainly to deviate the profound side effects encountered in usage of modern drugs. Since synthetic drugs have been shown to have side effects, clinical importance of herbal drugs in the treatment of hyperlipidemia has received considerable attention in recent years [4]. Various medicinal plants have reported to have hypolipidemic and hyperlipidemic properties[5;6]. *Allamanda neriifolia* Hook, locally known as yellow bell, belongs to the family Apocynaceae. It is an ornamental plant that grows abundantly throughout the country. An earlier study reported the isolation of new iridoids, soallamandicin, allamcin, allamancin, 3-*O*-methyl derivatives of allamcin and allamancin, allamcidin, allamcidin glucoside, 13-*O*-acetylplumieride, plumiepoxide, and plutoplumericin B and the known iridoids, plumericin, isoplumericin, allamandin, allamandicin, deglucosyl-plumieride, 13-*O*-p-coumaroyl plumieride, plumieride, protoplumericin, gardenoside and 10-dehydrogardenoside from the stems and leaves of *Allamanda neriifolia* Hook[7]. Plumericin, isoplumericin, and allamandin were found to be active against KB cell culture[8]. Plumericin and isoplumericin were reported to exhibit algicidal activity [9]. A previous study reported the isolation of a major iridoid, 13-*O*- (β-D-glucopyranosyl-p-coumaroyl) plumieride from the leaves and stems of Allamanda *neriifolia* Hook [10]. Considering traditional use of *Allamanda neriifolia* as antihyperlipidemic agent in Siddha literature, the present study was undertaken to investigate the hypolidemic effect of *Allamanda neriifolia* in atherogenic rats.

MATERIALS AND METHOD

Animals: Male albino rats of Wistar strain approximately weighing 100-125g were purchased

***Corresponding Author Address: M. Chitra, Dept of Biochemistry, Agricultural College and Research Institute,Thanjavur–613001,Tamilnadu, India; E-mail:** mschitra21@yahoo.com*

from the Indian Institute of Science, Bangalore and were housed in spacious polypropylene cages bedded with rice husk. The animal room was well ventilated and maintained under standard experimental conditions (27±2°C, 12h light/dark cycle) throughout the experimental period. All the animals were fed with standard pellet diet and water were provided ad libitum. They were acclimatized to the environment for one week prior to experimental use.

Preparation of extract: The flower of *Allamanda neriifolia Hook* were first washed well and dust was removed from the flower and were dried at room temperature The coarsely powdered flowers was extracted with 70% methanol for 48 hours. A semi solid extract was obtained after complete elimination of alcohol under reduced pressure.

Induction of hyperlipidemia: A single dose (350 mg/kg body weight i.p) of Triton WR – 1339 dissolved in saline solution was used for induction of hyperlipidemia in the rats. Hyperlipidemia was confirmed 48 hrs after triton injection by determining the blood cholesterol concentration [11]. The results were compared with that of the standard drug atrovastain at a dose of 10mg/kg b.w.

Experimental design and protocol: Overnight fasted rats were divided into four groups containing six rats in each group. Group I control received intraperitoneal administration of normal saline and distilled water orally. Animals of group II to IV were treated with intraperitoneal injection of triton WR-1339 to induce hyperlipidemia. Group III received 500mg Kg^{-1} of *Allamanda neriifolia* flowers extract and Group IV rats received atorvastatin (ATR) which was administered continuously for 7 days orally using infant feeding tube. Blood was collected by cardiac puncture for analysis of biochemical parameters. Serum samples were assayed for the total cholesterol l[12], triglycerides[13], HDL[14], Phospholipids[15], VLDLcholesterol[16]. Atherogenic Index was calculated by the following formula of AI = LDL-C/HDL-C.

RESULTS AND DISCUSSION

There was an elevation in plasma cholesterol, triglycerides, HDL, LDL and VLDL in response to induction of hyperlipidemia as compared to normal and control group. In this study, a significant increase in serum cholesterol and triglyceride levels due to Atorvastatin induction results mostly from an increase of VLDL secretion by the liver accompanied by strong reduction of VLDL and LDL catabolism. In rats treated with methanol extracts of *Allamanda neriifolia, was* a significant reduction in the level of total cholesterol, TGS, LDL, VLDL and phospholipids and increased HDL cholesterol when compared with control rats (Table1). Hyperlipidemic rats showed significantly increased levels of total cholesterol, TG, LDL, phospholipids and low HDL cholesterol, when compared with normal rats. Indeed AI was statistically increased in cholesterol control group when compared with the values found in normal control group.

The reduction of plasma total cholesterol was associated with decreased in its LDL fraction which is target of several hypolipidemic drugs. The cholesterol lowering activity of the flowers may be due to the enhancement of LDL catabolism through hepatic receptors for final elimination in the form of bile acids [17].HDL cholesterol have protective role in coronary heart disease [18].The ratio of LDL to HDL is a protective indicator of cardio vascular disease and the cholesterol induction produced a significant increase of this marker. HDL facilitates the mobilization of TG and cholesterol from plasma to liver where it is catabolised and eliminated in the form of bile acids by LCAT and inhibition of Hepatic Triglyceride Lipase [19]. Since an independent inverse relationship between blood HDL levels and cardiovascular risk incidence is reported [20] , treatment with methanol extract of *Allamanda neriifolia* increases HDL cholesterol level, exhibiting anti hyperlipidemic action. TG plays a key role in the regulation of lipoprotein interaction to maintain normal lipid metabolism and the elevated TG levels were associated with an increased incidence of coronary artery disease [21].

TG has also been proposed to be major determinant of cholesterol esterification , its transfer and HDL remodeling in human plasma. Methanol extract of *Allamanda neriifolica* significantly suppress the elevated concentration of TGS and is able to restore the catabolism of TG. However, many works with other plants, the catabolic mechanism of TGS would be due to the increased stimulation of the lipolytic activity of plasma lipoprotein lipase[22].

Atherogenic index is an important risk factor for diagnosis of atherosclerosis. Methanolic extract of *Allamanda neriifolia* reduced atherogenic index that is an important risk factor for atherosclerosis. Similar results were reported by other workers when studying the hypolipidemic effect of natural products [23]. This ameliorative action of *Allamanda neriifolia* was due to the plasma lipid lowering activity of different constituents of the plant. The administration of methanolic extract of *Allamanda neriifolia* significantly suppress the

higher values of LDL / HDL ratio showing the beneficial effect of this plant in preventing atherosclerosis incidence. This result is considered as an important for the treatment of hyperlipidemic induced atherosclerosis and apparently validates the folk medicinal uses of hyperlipidemic patient in India.

CONCLUSION

Finding from this study suggested that flowers of *Allamanda neriifolia* have good potentials for lipid management. However, further investigations to isolate and identify antihyperlipidemic principles in the flowers as well as elucidate its mode of action are required in future.

Table.1 Effect of methanol extracts of *Allamanda neriifolia Hook* on lipid profile of experimental rats.

Parameters	Group I	Group II	Group III	Group IV
Total Cholesterol (mg/dl)	76.41± 5.34	136.74± 9.57	84.15 ± 5.89	99.41± 6.95
Triglyceride (mg/dl)	82.12± 5.74	142.22 ± 9.95	104.32 ± 7.30	112.41± 7.86
LDL – Cholesterol (mg/dl)	58.09± 4.06	129.48± 9.06	73.07± 5.11	93.47 ± 6.54
VLDL – Cholesterol (mg/dl)	16.42 ± 1.14	28.44 ± 1.90	20.86 ± 1.46	22.48 ± 1.57
HDL – Cholesterol (mg/dl)	34.74 ± 2.43	21.18 ± 1.48	31.94 ± 2.23	28.42 ± 1.98
Phospholipids (mg/dl)	92.46 ± 6.47	154.32 ± 10.80	109.39 ± 7.65	113.11 ± 7.91
Atherogenic Index (AI)	1.67 ± 0.11	6.11 ± 0.42	2.28 ± 0.15	3.28 ± 0.22

Values are expressed as mean ± SEM; Values are finding out by using oneway ANOVA, followed by Newman Keul's Multiple range tests.

(a) Values are significantly different from Normal Control at $P < 0.01$

(b) Values are significantly different from hyperlipidemic control at $P < 0.01$.

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