



ANTIHYPERLIPIDEMIC ACTIVITY OF SOME MEDICINAL PLANTS - A SHORT REVIEW

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ABSTRACT

Hyperlipidemia is the greatest peril factor of coronary heart disease. Now a day's synthetic drugs have been related with number of side effects but herbal medicines have lipid lowering and antioxidant activities without any side effects. Some of the medicinal herbal plants used for hyperlipidemia, they are *Amaranthus caudatus* L. (Thandukeerai), *Butea monosperma* Lam. (Kincukam, Palasam), *Commiphora wightii* (Mahisaksiguggalu), *Cassia auriculata* (Aavarai), *Gymnema sylvestre* (Cirukurinca), *Glycyrrhiza glabra* Linn. (Adimaduram) *Hibiscus rosa-sinensis* Linn. (Sembaruthi), *Lagenaria siceraria* (Surakkai), *Moringa oleifera* Lam. (Murungai), *Morinda citrifolia* L. (Nuna), *Pterocarpus marsupium* Roxb. (Acamai, Acanapann), *Pongamia pinnata* (Pungai), *Sapindus emarginatus* Vahl. (Ponnankottai, Poovanthi), *Terminalia arjuna* (Roxb.) Wight & Arn. (Maruthampattai) etc. are used as antihyperlipidemic drug as per Unani and Ayurvedic literature. The review article is undertaken to study the herbal plants for antihyperlipidemic activity and various models used in this investigation. This review is particular on the anti- hyperlipidemic activity of the most recognizable herbal plants.

Key words: Hyperlipidemia, Medicinal plants, Antihyperlipidemic activity.

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INTRODUCTION

Hyperlipidemia is a disorder of lipid metabolism produced by increased plasma concentration of the various lipid and lipoprotein fractions, which cause the cardiac disease [1]. Hyperlipidemia is defined in a simple way by raised serum TC, TG, VLDL, LDL and IDL which are responsible for various complications like: heart attack, premature coronary artery disease, stroke, atherosclerosis, myocardial infarction and pancreatitis[2]. Hyperlipidemia can be either primary or secondary type, the primary syndrome may be treated by hypolipidemic drugs, but secondary induced by diabetes, hypothyroidism or renal lipid nephrosis which treated by treating the original disease moderately than hyperlipidemia [3].

Genetic disorders and lifestyle diet rich in calories, fat and cholesterol play a vital role to cause dyslipidemia around the world [4].

Some medicinal plants having antihyperlipidemic activity

Amaranthus caudatus L

Biological source: *Amaranthus caudatus* L. (Tamil Name: ThanduKeerai)

Family: Amaranthaceae

The methanolic and aqueous extracts of *Amaranthus caudatus* leaves at doses 200, 300 and 400 mg/kg body weight showed hypolipidemic activities. Methanolic extract showed significant reduction ($P < 0.01$) in the level of total cholesterol, triglycerides, LDL and raise in level of HDL at 400 mg/kg p.o, after 24 hr and 48 hr in Triton induced hyperlipidemic rats. Whereas aqueous extract showed significant decrease ($P < 0.05$) only in the level of triglycerides at 400 mg/kg p.o, after 24 hr and 48 hr [5].

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Butea monosperma Lam.

Biological source: *Butea monosperma* Lam.
(Tamil Name: Kincukam, Palasam)
Family: Fabaceae

The ethanolic extract of the leaves *Butea monosperma* showed the hypolipidemic activity in high fat diet induced atherosclerotic rat at doses of 200 and 400 mg/kg body weight. It decreased the serum lipid parameters like Total cholesterol, triglycerides, LDL-Cholesterol along with raise in HDL-cholesterol after 28 days treatment. The leaves of this plant may have the active constituents that may be effective in treatment of hyperlipidemia and atherosclerosis [6].

Commiphora wightii (Arn.)

Biological source: *Commiphora wightii* (Arn.)
(Tamil Name: Mahisaksi, Guggalu)
Family: Burseraceae

On rabbits, in which hyperlipidemia was induced by feeding cholesterol (in hydrogenated vegetable oil), it was confirmed for the first time it was proved that in hypercholesterolemic rabbits, guggulu lowers the serum cholesterol and protected these animals from cholesterol induced atherosclerosis. It also reduced the body weight of the animals. Similar results were found in patients with obesity and hypercholesterolemia. Guggulipid contain guggusterones which is responsible for guggulu's hypolipidemic activity. Guggulu showed its hypolipidemic effect in clinical studies and the lipid profile has been changed. This study showed significant decrease in total cholesterol and LDL cholesterol after treatment with guggulu [7,8,9].

Cassia auriculata Linn

Biological source: *Cassia auriculata* Linn (Tamil Name: Aavarai)
Family: Caesalpiniaceae

Ethanolic extract of *Cassia auriculata* flowers (Et-CAF) was investigated in Triton WR1339-induced hyperlipidemic rats. Treatment with the Et-CAF (450 mg/kg b.wt) significantly reduced the total cholesterol (TC), triglycerides (TG) and low-density lipoprotein-cholesterol (LDL) levels and significantly raised the high-density lipoprotein (HDL) level associated with reduction of atherogenic index in hyperlipidemic rats [10].

Gymnema sylvestre R.Br.

Biological source: *Gymnema sylvestre* R.Br.
(Tamil Name: Sirukurinjan)
Family: Asclepidaceae.

The Leaf part of *Gymnema sylvestre* is used for treating diabetes mellitus, obesity and insect bites. The study was done on anti-hyperlipidemic activity of leaf extract in cholesterol high fat diet (CHFD) induced hyperlipidemic rat models. The treatment of hyperlipidemic rat with leaf extract at 25-100 mg/kg dose

along with cholesterol diet shown significantly reduce in serum triglyceride (TG), total cholesterol (TC), very low-density lipoprotein (VLDL) and low-density lipoprotein (LDL) [11].

Glycyrrhiza glabra Linn.

Biological source: *Glycyrrhiza glabra* Linn.
(Tamil Name: Adimaduram)
Family: Leguminosae

The ethanolic (95%) extract of root of *Glycyrrhiza glabra* and its fractions were evaluated for its antidyslipidemic activity on HFD induced dyslipidemic hamsters. Ethanolic extract and its ethyl acetate soluble, water soluble and hexane soluble fractions decreased serum level of total cholesterol by 25.9, 38.0, 39.0 and 26.3%, respectively. On the other hand ethanolic extract, ethyl acetate soluble, water soluble and hexane soluble fraction increased the serum HDL-cholesterol level by 14.8, 34.3, 27.3 and 17.2% respectively. The reduction in LDL-cholesterol level by ethanolic extract, ethyl acetate soluble fraction and water soluble fraction were 43.9, 31.0, 33.4 and 24.6% respectively [12].

Hibiscus rosa-sinensis Linn.

Biological source: *Hibiscus rosa-sinensis* Linn.
(Tamil Name: Sembaruthi)
Family: Malvaceae

Oral administrations of 500mg/kg body weight of various fractions of chosen plant were investigated for possible antihyperlipidemic activity in triton and atherogenic diet-induced hyperlipidemic rats for duration of 48h and 14days respectively. In triton model, hyperlipidemia was induced by intra-peritoneal injection of a saline solution of triton 400 mg/kg in rats, whereas in diet induced model, rats were made hyperlipidemic by giving atherogenic diet for 20days using oral route of administration. A comparative assessment was also made between the actions of chosen drug with Simvastatin known antihyperlipidemic drug oral administration of 500 mg/kg body weight of ethanolic extract residual fraction of *Hibiscus rosa-sinensis* Linn. flowers exhibited a significant decrease ($P < 0.01$) in serum lipid parameters such as triglycerides, total cholesterol, low density lipoprotein (LDL), very LDL and raise in high density lipoprotein in hyperlipidemic rats when compared with hyperlipidemic control in both models [13].

Lagenaria siceraria (Molina) Standl.

Biological Source: *Lagenaria siceraria* (Tamil Name: Suraikkai)
Family: Cucurbitaceae

It contains good amount of minerals and amino acids. The fruit juice contains β -glycosidase-elasterase enzyme. Reported that the fractions from the methanolic extract of LS fruit had significantly reduced the elevated

triglyceride, cholesterol, and LDL and increased HDL level of triton treated hyperlipidemic rats [14].

***Moringa oleifera* Lam.**

Biological source: *Moringa oleifera* Lam.

(Tamil Name: Murungai)

Family Moringaceae

The methanolic extract of *Moringa oleifera* (150, 300 and 600 mg/kg, p.o.) and simvastatin (4 mg/kg, p.o.) along with hyperlipidemic diet were administered to Albino Wistar rats for 30 days in order to observe hyperlipidemic effect. Triglycerides, VLDL, LDL, and atherogenic index were reduced by *M. oleifera* and simvastatin but HDL level was increased as compared to the corresponding high fed cholesterol diet group (control). *M. oleifera* was also found to increase the excretion of fecal cholesterol. Thus, it can be concluded that *M. oleifera* possesses a hypolipidemic effect [15].

***Morinda citrifolia* L.**

Biological source: *Morinda citrifolia* L. (Tamil Name: Nuna)

Family Rubiaceae

The hypolipidemic effect of *M. citrifolia* extract in rats was determined by measuring the total lipid, total cholesterol and triglyceride concentrations in blood (plasma) and liver tissue. The administration of medium dose of *M. citrifolia* extract had significantly ($p < 0.05$) reduced the cholesterol content in blood and liver of normal rats as compared to the normal control rats [16].

***Pterocarpus marsupium* Roxb.**

Biological source: *Pterocarpus marsupium* Roxb. (Tamil Name: Acamai, Acanapann)

Family: Fabaceae

The ethanol extracts of *Pterocarpus marsupium* combined extracts of wood and barks were evaluated for its antidiabetic and hypolipidemic effect in Wistar albino rats. The effect of ethanol extracts of *Pterocarpus marsupium* on blood glucose, plasma insulin, serum lipid profile [total cholesterol, triglycerides, low density lipoprotein - cholesterol (LDL-C), very low density lipoprotein - cholesterol (VLDL-C), and high density lipoprotein-Cholesterol (HDL-C)] serum protein were measured in the diabetic rats. The ethanol extracts of *Pterocarpus marsupium* proved in significant reductions of blood glucose ($p < 0.01$), lipid parameters except HDL-C, serum enzymes and significantly raised HDL-C. From the above results it is concluded that ethanol extracts of *Pterocarpus marsupium* possesses significant antidiabetic and antihyperlipidemic effects in alloxan induced diabetic rats [17].

***Pongamiapinnata* (L.) Pierre**

Biological source: *Pongamia pinnata* (L.) Pierre (Tamil Name: Pungai)

Family: Leguminosae

In diet induced model, chloroform extract of Leaves of *Pongamiapinnata* significant serum lipid lowering effects in triton WR1339 led induced hyperlipidemic rats which brought down total cholesterol, triglycerides, phospholipids, LDL, VLDL and increased level of HDL in comparison of diet induced hyperlipidemic control at 14th day [18].

***Sapinduse marginatus* Vahl.**

Biological source: *Sapindus emarginatus* Vahl. (Tamil Name: Ponnankottai, Poovanthi)

Family: Sapindeae

The anti-hyperlipidemic activity of methanol extract of pericarps of SE against Triton induced hyperlipidemia in rats. SE was administered at a dose of 100 and 200 mg/kg. To Triton induced hyperlipidemic rats. Fenofibrate was used as reference standard. The statistical analysis was carried out using one way ANOVA followed by Dunnett's multiple comparisons test. SE shows a significant reduction in the levels of serum cholesterol, phospholipids, triglyceride, LDL, VLDL and significant raise in the level of serum HDL at the dose of 100 and 200mg/kg (p.o) against Triton induced hyperlipidemic in rats. Methanol extracts decreased serum level of total cholesterol by 69.72%. On the other hand aqueous extract of SE increased the serum HDL cholesterol level by 24.11%. The reduction of LDL cholesterol level by extract was 30.31% [19].

***Terminalia arjuna* (Roxb.) Wight & Arn.**

Biological source: *Terminalia arjuna* (Roxb.) Wight & Arn. (Tamil Name: Maruthampattai)







Family: Combretaceae

Ethanol fraction of *Terminalia arjuna* on blood lipids and atherosclerosis in rabbits fed with high fat diet (HFD). Twenty New Zealand rabbits of either sex were randomly divided into five groups: the first two were normal diet group and HFD (21% fat) group and the remaining three groups received high cholesterol diet with addition of standard drug (Atorvastatin 10 mg/kg), *T. arjuna* ethanol fraction (100 and 200 mg/kg), respectively. The concentration of total cholesterol (TC), low density lipoprotein (LDL) cholesterol, triglycerides (TG), very low density lipoprotein (VLDL) cholesterol and high density lipoprotein (HDL) cholesterol was determined in rabbits at the start of the experiment, at the 14th, 30th days and at the end of the study. Anti-atherogenic index was calculated from the lipid profile of the rabbits before sacrifice. At the end of the experimental period, the aorta was removed for assessment of atherosclerotic plaques. Results show that *T. arjuna* significantly reduced TC, LDL and TG levels and raises HDL and lessens atherosclerotic lesion in aorta ($P < .05$). Hence *T. arjuna* extract can effectively prevent the development of atherosclerosis [20].

organs, especially the eyes, kidneys, nerves, heart, and blood vessels.

Long-term complications of diabetes include retinopathy with potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputations, and Charcot joints; and autonomic neuropathy causing gastrointestinal,

genitourinary, and cardiovascular symptoms and sexual dysfunction. Patients with diabetes have an increased incidence of atherosclerotic cardiovascular, peripheral arterial, and cerebrovascular disease. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes.

<p style="text-align: center;"><i>Amaranthus caudatus</i> L.</p> 	<p style="text-align: center;"><i>Butea monosperma</i> Lam.</p> 
<p style="text-align: center;"><i>Commiphora wightii</i> (Arn.)</p> 	<p style="text-align: center;"><i>Cassia auriculata</i> Linn</p> 
<p style="text-align: center;"><i>Gymnema sylvestre</i> R.Br.</p> 	<p style="text-align: center;"><i>Glycyrrhiza glabra</i> Linn.</p> 

Hibiscus rosa-sinensis Linn.



Lagenaria siceraria (Molina) Standl.



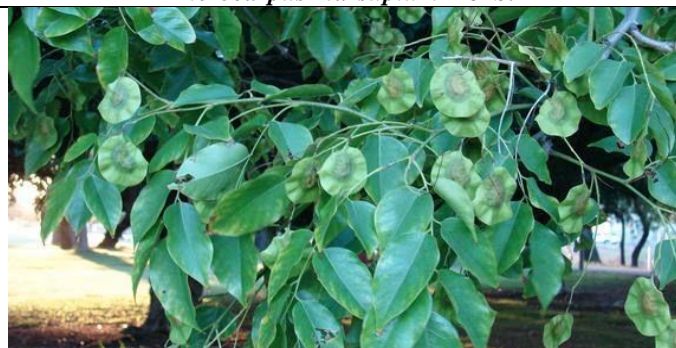
Moringa oleifera Lam.



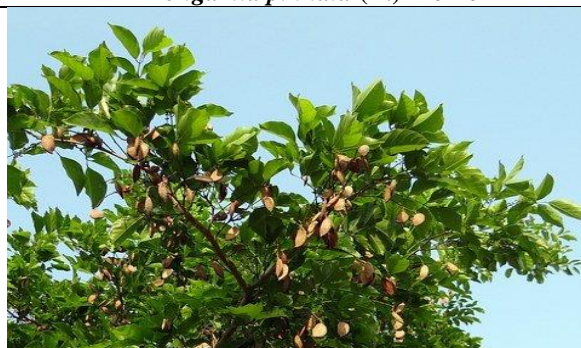
Morinda citrifolia L.



Pterocarpus marsupium Roxb.



Pongamia pinnata (L.) Pierre



Sapindus emarginatus Vahl.



Terminalia arjuna (Roxb.) Wight & Arn.



Conclusion

Hyperlipidemia is related to cardiovascular disorder. Hypolipidemic drugs are extensively used to prevent such disorders, but these drugs have other adverse effects. However, due to adverse side effects, there is a demand

for new compounds for the treatment of hyperlipidemia. The potency of herbal drugs is significant and they have negligible side effects than the synthetic hypolipidemic drugs. Patients demand these natural products due to their hypolipidemic activities. This review acts as a ready

reference for the scientific community, in specific to researchers and students looking for sources of knowledge on medicinal plants that leads for new

bioactive compounds and develops an increased interest in these medicinal plants.

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