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HYPOLIPIDAEMIC ACTIVITY OF THE SIDDHA MEDICINAL PLANTS

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ABSTRACT: Hyperlipidaemia (*Adhi dhoola noi*) is a well known metabolic disorder, prevalent in 30-40% of the people worldwide. It is one of the most important factors of morbidity and mortality related to atherosclerotic cardiovascular disease and diabetes. Research articles prove hyperlipidaemia as an important factor that determines the risk of atherosclerotic heart disease and endocrinal disorders. Siddha Medical system is one of the ancient one in which medicinal plants contributes a vital role in the making of single and compound formulations. Siddha medicinal plants can play an important role in the reduction of hyperlipidemic state with proven evidence-based research. This warrants introduction of Siddha medicinal plants in the treatment of hyperlipidaemia. This review article recites various polyherbal Siddha formulations and single herbs as a hypolipidaemic drugs with scientifically proven measures which are equally effective, safe to use, affordable and easily acceptable.

INTRODUCTION: Hyperlipidaemia is a disorder of lipid metabolism. This disorder manifests as elevation of plasma cholesterol, triglycerides (or) low HDL level or all of the above. Based on CARDIA (Coronary Artery Risk Development in Young Adults) study, which was conducted among 5000 young adults of age group 18-30 years with an increased Body Mass Index (BMI) are at a high risk of developing complications due to hyperlipidemia. Increased VLDL, LDL and total cholesterol levels and decreased HDL level renders more atherogenic blood vessels which could result in coronary insufficiency (or) ischemic heart disease.

National Cholesterol Education Program (NCEP) has mentioned about detection, types, evaluation, and management of hyperlipidemia in adults in treatment panel ATP-III. ¹ Hyperlipidemia results in a metabolic syndrome which is characterized by obesity, Insulin resistance, and endothelial cell dysfunction which ultimately ends in hypertension, diabetes (or) stroke ². According to the World Health Organization (WHO), most of the world's population is dependent on traditional medicines.

Siddha Literature has described the various usages of polyherbal formulations in hyperlipidemia. Even though there are variable Siddha formulations, this study mainly includes the use of Venthamarai chooranam, Neerzhivu chooranam, Thiripala chooranam, Maruthampattai chooranam, Kariveppilai chooranam in the treatment of hyperlipidemia. It also enumerates the phytochemistry, parts to be used along with botanical and common names ^{3, 4, 5}.

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This study provides a list of multi-herbal formulations and comparisons of their efficacy and analysis of individual chemical constituents of various herbal formulations that could have a hyperlipidaemic lowering activity. There is a warning alarm mentioned by National Commission of Macroeconomics and Health (NCMH) in India has estimated that by 2015 approximately 52 million Indian patients will develop coronary artery disease: out of this about 23 million will be less than 40 years of age⁶.

Siddha Medicinal Plants compared with that of Current Research: Siddha medicine is widely used in various diseases like diabetes, atherosclerosis, rheumatoid arthritis, etc. Siddha Medicines have been prepared as multi-herbal formulations that have a hyperlipidaemic lowering

activity since ages which reinforces the effectiveness of Siddha medicinal plants in hyperlipidemia. Several medicinal plants have been proved to act through various mechanisms like inhibition of microsomal triglyceride transfer protein (MTP), acyl-coenzyme A (COA) cholesterol acyltransferase (ACAT), diacylglycerol and acyltransferase (DGAT) and farnesoid X receptors (FXR). Among various Siddha herbal formulations, Venthamarai Chooranam **Table 1**, Madhumeega Chooranam **Table 2**, Thribala Chooranam **Table 3**, Maruthampattai Chooranam **Table 4**, Karivepillai Chooranam **Table 5** which are having multiple bioactive ingredients act as lowering the hyperlipidaemic state. Some of the interesting medicinal plants are described based on proven scientific studies.

TABLE 1: INGREDIENTS OF VENTHAMRAI CHOORANAM

S. no.	Botanical Name/ Tamil name	Family	Part of being used	Important Alkaloids	Actions
1.	<i>Elettaria cardamomum</i> (L.) Maton ELAM	Zingiberaceae	Fruit & Seed	Oleum, cardamoni, terpinol	Hypolipidaemia, Hypoglycemic ^{7, 8, 9}
2.	<i>Zingiber officinalis</i> Roscoe CHUKKU	Zingiberaceae	Rhizome	Zingiberneol, β-bisabolene, gingerin, oleoresin	Hypolipidaemia, diabetic, dyslipedemic, antioxidant ^{10, 11}
3.	<i>Piper longum</i> , Linn. THIPPLI	Piperaceae	Root & fruit	Piperine, guniesine, methyl pluvitilo, pipataline	Hypolipidaemia, Antioxidant, cardiac disease ^{13, 14}
4.	<i>Glycyrrhiza glabra</i> , Linn. ATHIMADHURAM	Fabaceae	Root	Glycyrrbizin, glycyrrhizinate	Hypolipidaemia, Hypoglycemic ^{15, 16}
5.	<i>Anethum graveolens</i> Linn. SADAKUPPAI	Apiaceae	Leaves	Coumarin, Vit. C, α-terpinene, flavanoids, steroids -xanthome glucoside	Hypolipidaemia ^{17, 18}
6.	<i>Cuminum cyminum</i> CHEERAKAM	Apiaceae	Seed	Cuminaldehyde	Hypolipidaemia ^{19, 20}
7.	<i>Nelumbo nucifera</i> Garten THAMARAI	Nelumbonaceae	White flowers	Lupeol, β-Sitosterol, nuciferine, N-Norarmeparine	Lipolytic, Cardiac Disease ^{21, 22, 23}

***Elettaria cardamomum* (L.):** Chaudhari H. S, *et al*,⁸ has mentioned in review article as Aqueous extract of *Elettaria cardamomum* (100 - 200 mg/kg per oral) for 30 days has significantly decreased the level of total cholesterol, triglycerides, LDL-C, VLDL and has increased HDL-C Levels.

***Zingiber officinale*:** Bhandhari *et al*,¹⁰ has reviewed that ethanolic extract of ginger (200 mg /kg) orally for 20 days produced a significant reduction of blood sugar in diabetic rats and also reduction in lipid levels are noted.

***Piper longum*:** Jin Z, *et al*,^{13, 14} has reviewed that use of an ethanolic extract of piper has reduced the cholesterol levels.

***Glycyrrhiza glabra*:** Santhosh Kumar Maurya *et al*,¹⁵ reviewed that ethanolic extract of *Glycyrrhiza glabra* (100 mg/kg/day) for 30 days has markedly reduced the lipids level.

***Anethum graveolens*:** Iyer D *et al*,¹⁸ have previewed that ethanolic extract of that plant reduces the cholesterol levels.

***Cuminum cyminum*:** Vaibhav Srivastava *et al*,¹⁹ revised that ethanolic extract of the seeds given for 20 days has significantly lowered the lipid levels.

***Nelumbo nucifera*:** Subhasini *et al*,²² has studied the effects of the plant in male wistar rats which has proved anti lipidaemic activity.

Terminalia chebula: Maruthappan et al,²⁵ 1.05 mg, 1kg, 1b.w & 2.10 mg/kg/b.w for 14 days given for atherogenic diet induced hyperlipidaemic rats has reduced the lipoprotein levels.

Murraya Koenigii: Khan BA, et al,²⁷ has reviewed the ethanolic, petroleum and chloroform leaf

extract has markedly reduced the blood sugar and lipid levels.

Phyllanthus emblica: Arunab Bhattacharya et al,³² has reviewed that methanol and water solvent extract (5 - 10 mg/kg) for 7 days has inhibited lipid peroxidation.

TABLE 2: INGREDIENTS OF MADHUMEGA CHOORANAM (MMC)

S. No.	Botanical name/ Tamil name	Family	Parts to be used	Phytochemical constituents	Actions
1.	<i>Terminalia chebula</i> (Retz) KADUKKAI	Combretaceae	Fruit	Phenolic compounds, punicalagin, Terflavin-A, terchebulin girin,	Antiobesity, hypolipidaemia ^{24, 25}
2.	<i>Murraya koenigii</i> (L.) KARIVEPPILAI	Rutaceae	Leaf	Isomahanibine, koenimbine, koengicine	Hypolipidaemia, Hypoglycaemic ^{26, 27}
3.	<i>Phyllanthus emblica</i> (Linn.) Gaertn NELLIKAI	Euphorbiaceae	Fruit	Trigalloylglucose, phyllembic acid, terchebin	Hypolipidaemia, anti-oxidants, rich source of Vit. C ^{28, 29, 30}
4.	<i>Tinospora cordifolia</i> (Willd) SEENTHIL	Menispermaceae	Stem	Flavanoid, Diterpene-10 - Hydroxycolumbin, tinosporidine	Hypolipidaemia, Anti-diabetic, anti-oxidant ^{31, 32}
5.	<i>Syzygium cumini</i> (L), S. <i>jambolanum</i> (Lam) NAAVAL	Myrtaceae	Bark, seed	Betalinic acid, kaempferol, isoquerlitrin	Hypolipidaemia, Anti-diabetic, antioxidant ^{33, 34}
6.	<i>Cyperus rotundus</i> (Linn.)	Cyperaceae	Tuber	Flavonoid glucoside cypernel I, II and cypertundone	Hypolipidaemia, Anti-hypertensive ^{35, 36, 37}
7.	<i>Phyllanthus amarus</i> , Schume Tnonn KEEZHANELLI	Euphorbiaeae	Whole plant	Ellagitannin-Phyllanthin D	Anti-diabetic, hypolipidaemic ^{38, 39}

Tinospora cordifolia: Veena Sharma et al,³³ has reviewed that petroleum and another plant extract in rats (200 mg/kg for 28 days) produces a marked reduction in body weight.

Syzygium cumini: Sharma SB et al,³⁴ has reviewed that ethanolic seed extract of cumini in diabetic rats showed marked changes in a lipoprotein.

Cyperus rotundus: Bambhole VD et al,³⁷ has reviewed that aqueous and alcoholic extract for 90 days showed. Lipolytic action and it has mobilized fat in rats.

Phyllanthus amarus: A.K.K Khana F et al,³⁸ has reviewed the plant extract (250 mg 1kg/ weight) for

30 days in Triton Wistar Rat 1339 showed that it inhibits hepatin cholesterol biosynthesis and increased fecal bile acid excretion and enhanced plasma lecithin (LCAT) and cholesterol acyltransferase.

Terminalia chebula: Priya F, et al,⁴² has reviewed that 250 – 500 mg /kg powder given in Triton Wistar Rat 1339 showed that it reduces total cholesterol.

Phyllanthus emblica: Yokazawa T, et al,⁴³ has reviewed that (10-40 mg/kg/b.w) for 2 months reduces the hyperlipidemia and has antioxidative actions.

TABLE 3: INGREDIENTS OF TRIPHALA CHOORANAM (TPC)

S. no.	Botanical name/ Tamil name	Family	Parts to be used	Important Alkaloids	Actions
1	<i>Terminalia chebula</i> , Retz KADUKKAI THOOL	Combretaceae	Fruit	Phenolic compounds, punicalagin, terflavin-A, terchebulin	Hypolipidaemia, anti-obesity ^{40, 41, 42}
2	<i>Phyllanthus emblica</i> , Linn. NELLIVATRAL	Euphorbiaceae	Fruit	Trigalloyl glucose, phyllembic acid, terachebin	Rich source of Vit. C, anti-oxidant, hypolipidaemia ⁴³
3	<i>Terminalia bellerica</i> , Gaertn THAANDRIKKAI THOOL	Combretaceae	Fruit	Belleric acid, bellericoside, gallic acid, ellagic acid, mannitol	Hypolipidaemia ^{44, 45, 46}

Terminalia bellerica: B. Ahirwar et al,⁴⁵ has reviewed that ethanolic extract of 200 - 250 g in male adult albino rats for 45 days orally which showed marked reduction in lipoproteins.

Terminalia arjuna: Saravana Subramanian, et al,⁴⁸ has reviewed that ethanol, diethyl ether, ethyl acetate extract 175 - 350 mg/kg b.w in female Albino mice, male Wistar rats has shown that it reduces hyperlipidaemia and anti oxidant.

Gossypium herbaceum: C. Velmurugan et al,⁴⁹ has reviewed that ethanol extract of leaves (200 mg/kg b.w) has significantly reduced lipids levels in diabetes.

Curcuma longa: P. Suresh Babu et al,⁵² has reviewed that aqueous and alcoholic extract 100 mg/kg/b.w one in 9 days for 2 weeks significantly reduces lipid levels in diabetes.

Coscinium fenestratum: Shanmugam Manoharan et al,⁵⁴ has reviewed that ethanolic extract of 300 mg/kg b,w for 45 days/alloxan induced in wistar rats showed anti-hyperlipidaemic and anti glycaemic activity.

Salacia reticulata: Yoshikawa et al,⁵⁶ has reviewed those polyphenol constituents with lipase inhibitory and lipolytic activities in rats.

TABLE 4: INGREDIENTS OF MARUTHAM PATTAI CHOORANAM

S. no.	Botanical name/ Tamil name	Family	Parts to be used	Alkaloids	Actions
1	<i>Terminalia arjuna</i> Wight & Arn. MARUDU	Combretaceae	Bark	Triterpene arjunolitin, Arjunolone, arjunetin, arjunic acid, Terminolitin	Cardiac disease, Hypolipidaemia ^{47, 48}

TABLE 5: INGREDIENTS OF KARIVEPPILAI CHOORANAM

S. no.	Botanical name/ Tamil name	Family	Parts to be used	Important Alkaloids	Actions
1	<i>Murraya koenigii</i> (L.) KARIVEPPILAI	Rutaceae	leaf	Girin, isomahanibine, koenimbine, koengicine	Anti-diabetic, hypolipidemia, anti-oxidant ^{26, 27}
2	<i>Gossypium herbaceum</i> (L.) PARUTTI	Malvaceae	Seed	Gossypin	Anti-diabetic hypolipidemia ^{49, 52}
3	<i>Curcuma longa</i> (L.) MANJAL	Zingiberaceae	Rhizome	Curcumin, β - turmenone, demthoxy curamin	Anti-oxidant hypolipidemia ^{51, 52, 53}
4	<i>Coscinium fenestratum</i> (Gaertn) MARAMANJAL	Menzspermeaceae	Rhizome	Berlambine, oxo-berberine, stigmaterol	Anti-oxidant hypolipidemia ⁵⁴
5	<i>Terminalia chebula</i> KADUKKAI	Combretaceae	Pericarp	Pinicalagin, Terflavin.A, Terchebuin	Anti-diabetic, hypolipidemia cardioprotective ^{40, 41, 42}
6	<i>Terminalia bellirica</i> THANDRIKKAI	Combretaceae	Pericarp	Belleric acid, mannitol	Hypolipidemia ^{44, 45, 46}
7	<i>Emblia officinalis</i> NELLI MULLI	Euphorbiaceae	Pericarp	Trigalloyl glucose, phyllembic acid	Antioxidant, hypolipidaemia ⁴⁶
8	<i>Salacia reticulata</i> KADAL AZHINGIL	Celestraceae	Root	Quinonemethide, lenmbachol C, D, pristimeria	Antidiabetic, lipase inhibitory, lipolytic ^{55, 56}

TABLE 6: LIST OF HYPOLIPIDAEMIC ACTIVITY OF SIDDHA MEDICINAL PLANTS

S. no.	Botanical name/ Tamil name	Family	Part of being used	Important Alkaloids
1	<i>Curcuma amada</i> (Roxb) MANGAI INJI	Zingiberaceae	Rhizome	β ,d, Curcumene, d- Pinene, d-Camphor, β - d - curcumene, Phytosterol ⁵⁷
3	<i>Myristica fragrans</i> . (Houtt) SAATHIKAI	Myrtaceae	Fruit	Eugenol, isoeugenol, methyl eugenol, myristicin, trimyristin ⁵⁸
4	<i>Pueraria tuberosa</i> (Dc) NILA POOSANI	Papilionaceae	Root	Puerarin, tuberostan cardiac glycoside ⁵⁹
5	<i>Tinospora cordifolia</i> (Wild) SEENTHIL	Menispermaceae	Stem	Tino Cardifolin, tinosporidine, tinosporaside, cleodane ⁶⁰
6	<i>Caesalpinia bonduc</i> (L.) (Roxb.) KALICHIKAI	Caesalpinaceae	Fruit, leaf	α , β and δ caesalpines, pentacyclic, triterpenoid (+) ononitd, cephanone ⁶¹
8	<i>Allium cepa</i> (Linn.) VENGAYAM	Alliaceae	Bulb	Quercetin, cycloallin, phenolic acid ⁶²

9	<i>Allium sativum</i> (Linn.) VALLAI - PUNDU	Alliaceae	Bulb	Ajuene, Y - glutamyl peptides, F- gitonin, degalactotigonin ⁶³
10	<i>Capparis decidua</i> (Forsk) SENGAM	Capparaceae	Bark, fruit	Capparilline, N- triacontanol, capparisinine ⁶⁴
11	<i>Cinnamomum Verum</i> (J.S.Presl) LAVANGA PATTAI	Lauraceae	Leaf	Eugenol, linalool, benzaldehyde, benzyl cinnamaldehyde, pinene, cymene ⁶⁵
12	<i>Commiphora mukkul</i> (Enzler) KUNGILYUM	Burseraceae	Resin	Resins, Z-Guggulusterone, E- Guggulusterone, guggulsterol I-V ⁶⁶
13	<i>Enicostema axillary</i> (Lam) VELLARUGU	Gentianaceae	Whole plant	Swertiamarin, gentianine, swertisin 5-0, glycosyl swertisin, myristic acid ⁶⁷
14	<i>Garcinia combogia</i> (G) KODUAM PUZHI	Clusiaceae	Fruit	(-) Hydroxycitric acid, tartaric acid. ⁶⁸
16	<i>Saussurea lappa</i> (C. B. Clake) KOSTUM	Asteraceae	Root	Costunolide, dehydrocostus, lactone ⁶⁹
17	<i>Trigonella foenum & T. gracenum</i> (Linn.) VENDHAYAM	Papilionaceae	Seed	Graecunnins A-G, trigofenosides, gitogenin, C- trigonelline, quercetin ⁷⁰
18	<i>Coccinia grandis</i> (L.) Voigt KOVAI	Curcubitaceae	Leaves, fruit, root	Lupeol, cucurbitacin, β -sitosterol, β - carotene, linoleic, oleic acids ⁷¹
19	<i>Aloe vera</i> (L.), Burm.F CHOTTU KATHALAI	Liliaceae	Leaves	Aloesone, aloesin, barbaloin, glycoside, β - barbaloin, iso-emodin ⁷²
20	<i>Alpinia officinarum</i> (SW) PERARATHAI	Zingiberaceae	Rhizome	Methyl cinnamate, cineol, caryophyllene I,II ⁷³ .
22	<i>Embelia Ribbes</i> , Burm. F VAIVILANGAM	Myrsinaceae	Fruit, seed	Embelin, quercitol, vilangin, christembin ⁷⁴
23	<i>Ocimum sanctum</i> (Linn.) Omeri canum (L.) NALLA THULASI	Lamiaceae	Leaves	Stigmasterol, volatile oil, caryophyllene ⁷⁵
24	<i>Medicago sativa</i> KUTHIVAI MAZAL	Leguminaceae	Leaves	Saponins, phytosterols, vitamins, coumarins ⁷⁶
25	<i>Ougenia oojeinensis</i> (Roxb.) NARIVENGAIAM	Papilionaceae	Bark	Lupeol, betulin, homoferreirin, ougenin ⁷⁷
27	<i>Sesbania grandiflora</i> (Poir.) AGATI	Papilionaceae	Leaves, flower, root	Oleanolic acid, Glucuronic acid ⁷⁸
28	<i>Pterocarpus marsupium</i> (Roxb.) VENGAI	Papilionaceae	Leaves, stem	Liquiritigenin, garbauzol, Glucosides, aurane ⁷⁹
29	<i>Achyranthes aspera</i> , (Linn.) NAIYURUVI	Amaranthaceae	Leaves	Oleanolic acid, ecdysone, ecdysterone, achyranthine ⁸⁰
31	<i>Linum usitatissimum</i> (Linn.) ALISI VIRAI	Linaceae	Seed	Phenylpropanoid, glucoside, Linnsitamarin, linseed oil ⁸¹
33	<i>Capparis dedicua</i> , Forsk, Edgew SENGAM	Capparaceae	Fruit, bark	Capparine, capparilline, n-petacosane, β - sitosterol ⁸²
34	<i>Aconitum</i> <i>heterophyllum</i> (Wall) ADHIVIDAIYAM	Renunculaceae	Leaves, stem	3-0- β -D- glucopyranoside 7 - 0 β - D- glucopyranosyl- (1 \rightarrow 3), quercetin 3 - 0 - β -D glucopyrmoside - 7 - 0- (6E - Cafferyl) β -D (1 \rightarrow 3) ⁸³
35	<i>Dalbergia latifolia</i> (Roxb.) ITTI	Papilionaceae	Bark	Methyl dalbergin , rotenoid, dalbinol ⁸⁴
37	<i>Hibiscus Cannabinus</i> (Linn.) PULICHHAI	Malvaceae	Leaves, seed	Isoquercitrin, cannabiscitrin, myricetin, phosphonolipids ⁸⁵
38	<i>Eclipta prostrata</i> (L.) Mant KARISALAI	Asteraceae	Whole plant	Terthienyl aldehyde ecliptal, nicotine, triterpenoid ⁸⁶
39	<i>Moringa oleifera</i> (Lam) KAATU MURANGAI	Moringaceae	Leaves, flower	Quercetin, 3-Rhamnoglucoside, kaempferol ⁸⁷
40	<i>Elaeocarpus sphaericus</i> NATTU RUTHRATCHAM	Elaeocarpaceae	Fruit, leaves	(-) - Isoleae, carpilline, rudrakine, fixed oil ⁸⁸
41	<i>Momordica charantia</i> (Linn.) REVAKAI	Cucurbitaceae	Fruit, leaf	Acylglucosyl sterols ⁸⁹

43	<i>Nardostachys jatamansi</i> (Dc) JATAMANJI	Valerianaceae	Rhizome	Jatamansone, sequitepene, angelicin, jatamansin ⁹⁰
44	<i>Coriandrum sativum</i> (Linn.) KOTHAMALLI	Apiaceae	Leaves, seed	Furoisocumarins, coriandrin, coriandrol, D-mannitol ⁹¹
45	<i>Syzygium cumini</i> (L.), <i>S. jambolanum</i> (Lam) C NAVAL	Myrtaceae	Fruits, seed	Myrecetin - 3 - 0 glucoside, robinoside, isoquercetin, anthocyanins ⁹²
46	<i>Nigella sativa</i> (Linn.) KARUNCHEERAGAM	Ranunculaceae	Seed	Dithymoquinone, nigilline, aarmacenine, transanetholic ⁹³
47	<i>Semecarpus anacordium</i> Linn. SHENKOTTAI	Anacardiaceae	Fruit	Bhilwanol, binaringenin, semecarpetin, galluflavanone ⁹⁴
48	<i>Acorus calamus</i> Linn. VASAMBU	Araceae	Rhizome	Callaminone, isocalamendiol, asarone - 3, β -asarone ⁹⁵
49	<i>Cynodon dactylon</i> (L.) Pers ARUGAMPULLU	Poaceae	Whole plant	Apigenin, luceolin, orientin, vitexin ⁹⁶
50	<i>Sesbania grandiflora</i> (L.) Poir AGATI	Papilionaceae	Leaves, flower	Oleanolic acid, galactose, glucuronic acid, cyanidin 3 – glucoside ⁹⁷
51	<i>Luffa cylindrica</i> (L.) M. Roem <i>L. aegyptiaca</i> Mill. PIRKANKAI	Cucurbitaceae	Tender fruits	Saponins lucyosides A, H, cucurbitacin B ⁹⁸
52	<i>Bauhinia purpureae</i> (Linn.) MANDARI	Caesalpiaceae	Flower	Tannin, isoquercitrin, quercitrin, chalcone glycoside ⁹⁹
55	<i>Scorpioidulcis</i> (Linn.) SARKARAI VEMBU	Scrophulariaceae	Whole plant	Scoparic acid, scopadulciol, amellin, root, mannitol ¹⁰⁰
56	<i>Hibiscus sabdariffa</i> (Linn.) PULICHAI KEERAI	Malvaceae	Leaves, seed	Citric acid, d - malic, hibiscus acid, gossypetin, sabdaritrin ¹⁰¹
57	<i>Tribulus terrestris</i> NEERUNJIL	Zygophyllaceae	Whole plant	Diosgenin, giogenin, chlorogenin, tribuloside ¹⁰²
58	<i>Macrotyloma uniflorum</i> KOLLU	Fabaceae	Seeds	Dolichin A and B ¹⁰³
59	<i>Mukia maderaspatana</i> (Linn.) MUSUMUSUKKAI	Curcubitaceae	Leaves, Root	Umbelliferone, xanthotoxol, isopimpinellin, scopoletin ¹⁰⁴
60	<i>Aegle marmelos</i> , (Linn.) Corr VILVAM	Rutaceae	Whole plant	Psoralen, xanthotoxin, Scopoletin, siummianine ¹⁰⁵
61	<i>Tragia involucrata</i> Linn. CHENTHATTI	Euphorbiaceae	Root	Ethylbenzene, limonene, tragia sapomine ¹⁰⁶
62	<i>Gymnema sylvestre</i> (Retz) P.Br.Ex. Schult SHIRUKURINJAN	Apocynaceae	Leaves	Gymnemasins A, D, gymnimagenine, gymnemic acid, gypenosides II, Nonacosane ^{107, 108}
63	<i>Spermacoce hispida</i> (Linn.) NATHAI CHURI	Rubiaceae	Seed	Isorhamnetin ¹⁰⁹
64	<i>Ziziphus jujuba</i> (L.) Gaertn ILLANTHAI	Rhamnaceae	Leaves	Jujuboside A, B, jubanine A, B, rutin, ziziphin, stephanine, Vit C

DISCUSSION AND CONCLUSION: Based on the Siddha literature and various review of the articles **Table 6**, Siddha medicinal plants have been proven as a beneficial role in the management of dyslipidemia. It is also observed that Madhumega Chooranam is very much effective in Type 2 diabetes with hyperlipidemia and Venthamarai Chooranam in hypertension with hyperlipidemia. It is evident that from the above-mentioned reviews, single herbal formulations have the same potency as that of the polyherbal formulations in controlling the hyperlipidaemic state.

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