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## “AAVARAI KUDINEER”- A POTENT POLYHERBAL SIDDHA FORMULATION FOR MANAGEMENT OF DIABETES MELLITUS

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### ABSTRACT

Diabetes mellitus is caused due to deficiency in production of insulin. It is a global problem and number of those affected is increasing day by day. Oral hypoglycemic agents use is restricted by their pharmacokinetic properties, secondary failure rates, and accompanying side effects and the world health organization expert committee on diabetes has listed as one of its recommendations that traditional methods of treatment for diabetes should be further investigated. Management of Diabetes mellitus in the Traditional, Indian, Siddha system of medicine is time tested. Many Siddha anti-diabetic formulations are reputed and popular. Many of the Siddha anti-diabetic formulations have been scientifically studied. Literature survey revealed that Siddha “Kudineer” anti-diabetic formulations are scientifically under explored. Siddha “Kudineer” anti-diabetic formulations are tailor made, effective, tried and trusted. Many of them are official also. They are economical. They can be prepared by the himself. This review work is a small step towards, scientifically studying the Siddha “Aavarai Kudineer” anti-diabetic formulation, so as to standardize and improve the formulation for the benefit of mankind.

**Keywords:** Diabetes mellitus, Siddha system of medicine, Aavarai Kudineer.

### INTRODUCTION

Diabetes mellitus is a complex metabolic disorder resulting from either insulin insufficiency or insulin dysfunction. Type I diabetes (insulin dependent) is caused due to insulin insufficiency because of lack of functional  $\beta$ -cells. Patients suffering from this are therefore totally dependent on exogenous source of insulin while patients suffering from Type II diabetes (insulin independent) are unable to respond to insulin and can be treated with dietary changes, exercise and medication [1]. 346 million people worldwide have diabetes. In 2004, an estimated 3.4 million people died from consequences of high blood sugar. More than 80% of diabetes deaths occur in low- and middle-income countries. WHO projects those diabetes deaths will double between 2005 and 2030.

Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes. Over time, diabetes can damage the heart, blood vessels, eyes, kidneys, and nerves.

Diabetes increases the risk of heart disease and stroke. 50% of people with diabetes die of cardiovascular disease (primarily heart disease and stroke). Combined with reduced blood flow, neuropathy in the foot increases the chance of foot ulcers and eventual limb amputation. Diabetic retinopathy is an important cause of blindness and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. After 15 years of diabetes, approximately 2% of people become blind and about 10% develop severe visual impairment. Diabetes is among the leading causes of kidney failure. 10-20% of people with diabetes die of kidney failure [2].

Wide arrays of plant derived active principles representing numerous phytochemicals have demonstrated consistent hypoglycemic activity and their possible use in the treatment of diabetes mellitus<sup>2</sup>. In the traditional system of Indian medicinal plant formulation and several cases, combined extracts of plants are used as drug of choice rather than individual. Many of these

have shown promising effect [3].

Diabetes Mellitus is a condition which can be compared with *Neerizhivu* in Siddha. The other names described in the texts are the *Madhumegham* and *Inippuneer*. The signs and symptoms explained is increased urination both in frequency and quantity, there will be flies surrounding the urine voided place, weight loss, dryness of the skin, etc.

In Siddha, the management of a disease not only depends on the medicine but the modification of food, habits, and lifestyle also. There are several medicines said in the literatures and practiced successfully by Siddha practitioners. The regulations in food, daily habits etc. are the specialty of most of these medicines. Some commonly used medicines are

1. Madhumegha choornam
2. Seenthil choornam
3. Naval chornam
4. Seenthil Kudineer
5. Aavarai kudineer
6. Abraga Parpam
7. Vanga parpam etc.,

In addition to the prepared medicines there are several herbal combinations said in the texts for the management of this disease. All these medicines are to be used with the prescription of a Siddha medical practitioner and with proper regimen. These medicines include several plants with anti-diabetic property like Jambolinar Naval (*Syzygium cuminii*) Sarkarai Kolli (*Gymnema Sylvestre*) Kadalazhinjil or Eganayakam (*Salacia reticulata*) Seenthil or Amrithu (*Tinospora cordifolia*) Vilwam (*Aigil marmalose*) etc [4].,

Siddha systems of medicines are more effective to control the type-2 diabetes. Yoga, traditional food and siddha medicines to control and prevent diabetes. In which **kudineer** is one of most important polyherbal formulations equally referred to khashayas in Ayurveda are more useful to prevent the diabetes and their associated complications. Besides, these formulations are only time tested, not scientifically proven and the ingredients are not well established in their scientific terms. Keeping the above information in view, it was thought worthy to study selected antidiabetic Sidhha Kudineer polyherbal formulations to create scientific evidence.

### SELECTION OF KUDINEER FORMULATION

Among the several anti-diabetic Siddha kudineer formulations in theraiyar's kudineer in the ancient Siddha literature, the Aavarai kudineer have been selected for this current research. Since it is very popular, reputed and the ingredients have been proved to be useful in the management of diabetes mellitus. It contains the following ingredients [5].

Aavarai iall ( <i>Cassia auriculata</i> , Leguminosae)	-1 part
Kondrai ilai ( <i>Cassia fistula</i> , Caesalpinaceae)	-1 part
Naval kottai ( <i>Syzygium cumini</i> Fam:Myrtaceae)	-1 part

Kadal azhingil ( <i>Salacia reticulata</i> , Celastraceae)	-1 part
Korai kizhangu ( <i>Cyprus rotandus</i> , Cyperaceae)	-1 part
Koshtam ( <i>Costus spiciosus</i> , Costaceae)	-1 part
Marutham pattai ( <i>Terminalia arjuna</i> , Combretaceae)	-1 part

### 1) *Cassia auriculata* Linn. [6-7]

**Biological Source & Family:** *Cassia auriculata* (Caesalpinaceae)



*Cassia auriculata* Linn.(Caesalpinaceae)

**Habitat:** Wild in dry regions of Madhya Pradesh, Tamil Nadu and Rajasthan. Cultivated in other parts of India.

**Botanical description:** Avaram (*Cassia auriculata* Linn), family Caesalpinaceae, is also known as Avaram tree, The leaves are alternate, stipulate, paripinnate compound, very numerous, closely placed, rachis 8.8-12.5 cm long, narrowly furrowed, slender, pubescent, with an erect linear gland between the leaflets of each pair, leaflets 16-24, very shortly stalked 2-2.5 cm long 1-1.3 cm broad, slightly overlapping, oval oblong, obtuse, at both ends, mucronate, glabrous or minutely downy, dull green, paler beneath, stipules very large, reniform-rotund, produced at base on side of next petiole into a filliform point and persistent. Its flowers are irregular, bisexual, bright yellow and large (nearly 5 cm across), the pedicels glabrous and 2.5 cm long. The racemes are few-flowered, short, erect, crowded in axils of upper leaves so as to form a large terminal inflorescence (leaves except stipules are suppressed at the upper nodes). The 5 sepals are distinct, imbricate, glabrous, concave, membranous and unequal, with the two outer ones much larger than the inner ones. The petals also number 5, are free, imbricate and crisped along the margin, bright yellow veined with orange. The anthers number 10 and are separate, with the three upper stamens barren; the ovary is superior, unilocular, with marginal ovules.

The fruit is a short legume, 7.5-11 cm long, 1.5 cm broad, oblong, obtuse, tipped with long style base, flat, thin, papery, undulately crimped, pilose, pale brown. 12-20 seeds per fruit are carried each in its separate cavity.

**Chemical constituents:** Pod husk contains nonacosane and nonacosan-6-one, chrysophanol, emodin and rubiadin.

**Medicinal uses:** Roots are used in skin diseases and asthma. The flowers are used in diabetes, urinary disorders and nocturnal emissions. The bark is used as astringent and the leaves and Flowers were used as anti-diabetic.

## 2) *Cassia fistula* Linn. [8-11]

**Biological Source & Family:** *Cassia fistula* (Caesalpinaceae)



*Cassia fistula* Linn. (Caesalpinaceae)

**Habitat :** Cultivated as an ornamental throughout India.

**Botanical description:** A large, branched shrub or small tree. Leaves wholly glabrous with yellowish or greenish – grey bark. Leaves paripinnate, 20-40 cm. long, leaflets 4-8 pairs, 5-16 x 4-7 cm. distinctly stalked, ovate or ovate-oblong, acute or acuminate, entire, coriaceous. Flowers bright- yellow, 30-55 cm. long, in axillary, pendulous lax racemes. Bracts minute, caducous. Calyx 5-partite, glabrous, caduceus. Stamens- 10, all with anthers. Pods 30-60 cm. long, cylindrical, pendulous, indehiscent, smooth, hard, dark brown or black, transversely divided or ribbed into numerous 1- seeded cells. Seeds embedded in soft, sweet, albuminous pulp.

**Chemical constituents:** The plant contains Rhein, aloemodin, kaempferol and emodin.

### **Medicinal uses:**

Flowers and pods- purgative, febrifugal, astringent and antibilious. Seed powder used in amoebiasis. Leaves contain Laxative property.

## 3) *Syzygium cuminii* (Linn.) Skeels. [12-15]

**Biological Source & Family:** *Syzygium cumini* (Myrtaceae)



## *Syzygium cuminii* (Linn.) Skeels. (Myrtaceae)

**Habitat :** Cultivated throughout India up to 1,800 m.

**Botanical description:** A moderate - sized, branched tree with dull-white or grey bark. Leaves oblong-lanceolate, falcately acuminate, petiolate, entire. Flowers whitish-green in short panicles with stouter branched. Berry globose, Ovoid-oblong, smaller in size.

**Chemical constituents:** Jambolan is rich in compounds containing anthocyanins, glucoside, ellagic acid, isoquercetin, kaempferol and myrecetin. The seeds are claimed to contain alkaloid, jambosine, and glycoside jambolin or antimellin.

### **Medicinal uses:**

Fruit are stomachic, carminative and diuretic. The bark and seed: anti-diarrhoeal. Seed: hypoglycaemic. Leaf: antibacterial, anti-dysenteric.

## 4) *Salacia chinensis* Linn. [16-17]

**Biological Source & Family:** *Salacia chinensis* (Hippocretaceae/Celastraceae)



*Salacia chinensis* Linn. (Celastraceae)

**Habitat :** A large, climbing shrub or small tree occurring throughout India, including the Andaman Islands. The plant is common in sacred groves and along hedges.

**Botanical description:** *Salacia chinensis* belonging to the family Celastraceae. It is a straggling shrub with deep yellow coloured root, leaves up to 7.5 X 3 cm, oblong or ovate, crenate – serrate, obtusely - acuminate at apex, coriaceous, glabrous, flowers 6 mm across, honey – scented, fascicled on axillary tubercles, pedicels ca 12 mm long. Calyx has puberulous outside. Petals are yellowish. Stamens reflexed when the flower is open over the conical disk.

**Chemical constituents:** The root bark contains proanthocyanidins, consisting of monomeric leucopelargonidin, its monomer, dimer and tetramer; triterpenoids (friedelin and its derivatives), mangiferine, phlobatannin and glucosidal tannins. The stem yielded gutta, dulcitol and proanthocyanidin consisting of dimer of leucopelargonidin.

**Medicinal uses:** Roots- used in diabetes. Also used for amenorrhoea, dysmenorrhoea and venereal diseases.

5) *Costus speciosus* (Koenig) Sm. [18-20]

**Biological Source & Family:** *Costus speciosus* (Coataceae)



*Costus speciosus* (Koenig) Sm.(Coataceae)

**Habitat:** Assam, North Bengal, Khasi and Jaintia Hills, sub Himalayan tracts of Uttar Pradesh and Himachal Pradesh and Western Ghats.

**Botanical description:** An erect, perennial, 2-4 ft. high herb with tuberous, horizontal, rhizomatous, root stock. Leaves 15-30 x 5-8-5 cm., sub sessile or very shortly petioled, oblong-ovate to oblanceolate, base rounded, acute or acuminate, sometimes caudate apex, dark-green, glabrous above and appressed pubescent beneath, white ciliate margined, sheath coriaceous, ligule none. Flowers showy, white with red bracts, many arranged in 4-10 cm. long, terminal, dense flowered spikes. Bracts bright-red, showy, oblong-lanceolate, 2.5-3.5 x 1-1.5 cm., bracteoles red. Calyx long, deltoid-ovate, cuspidate. Corolla white with yellowish centre, tube usually equal to the calyx, lobes 4-5 x 1.5-2 cm. obovate-oblanceolate, apiculate. Stamens filament with a tuft of hairs at their base, staminodes none. Style long, stigma with a semi-lunar ciliate mouth. Capsule 3-gonous, bright red. Seeds black.

**Chemical constituents:** The rhizomes contain saponins-dioscin, gracillin, diosgenin, beta-sitosterol and beta-D-glucoside.

**Medicinal uses:** Astringent, purgative, depurative, anti-inflammatory (used in gout, rheumatism; bronchitis, asthma, catarrhal fevers, dysuria), anthelmintic, antivermin, maggoticide, antifungal. The alkaloids show papaverine-like smooth-muscle-relaxant activity, cardiotoxic activity like that of digitalis and antispasmodic.

6) *Cyperus rotundus* Linn.[21-22]

**Biological Source & Family:** *Cyperus rotundus* (Cyperaceae)



*Cyperus rotundus* Linn.(Cyperaceae)

**Habitat:** Throughout India.

**Botanical description:** An erect, perennial with woody, subterranean, stoloniferous rhizome often clothed with fibrous remains of leaf-sheaths. Stem 15-60 cm. high, trigonous. Leaves basal, usually shorter than the stem, narrowly linear, finely acuminate. Inflorescence an umbel of condensed spikes. Bracts- 3, foliar, unequal, exceeding the umbel, longest one up to 15 cm. long. Spikelets pale- yellow and brown with reddish tinge, 4-1- on a spike. Glumes 3-4 mm. long, decurrent on the rachilla, ovate or boat shaped. Stamens-3, anthers apiculate. Style 0.4 cm. long Nuts ovoid-ellipsoid with 3- flat or concave sides, glabrous.

**Chemical constituents:** The plant contains essential oils, flavonoids, terpenoids, mono- and sesquiterpenes. Such as Cyprotene, cypera-2, 4-diene, a-copaene, cyperene, aselinene, rotundene, valencene, ylanga-2, 4- diene, g-gurjunene, trans-calamenene and d-cadinene.

**Medicinal uses:** Carminative, astringent, anti-inflammatory, antirheumatic, hepatoprotective, diuretic, antipyretic, analgesic, hypotensive and nervine tonic.

7) *Terminalia arjuna* (Roxb.) W. & A. [23-25]

**Biological Source & Family:** *Terminalia arjuna* (Combretaceae)



*Terminalia arjuna* (Roxb.) W. & A.(Combretaceae)

**Habitat:** Throughout the greater part of India, also grown as an avenue tree.

**Botanical description:** A medium-sized or large handsome tree with grey bark. Leaves 8-15 x 4-7 cm. sub-opposite, oblong or elliptic, obtuse, acute, with 1 or 2 glands at the base of lamina or on the petiole, narrowed towards the base, slightly crenulate. Flowers light-yellow, in terminal or axillary, pendulous, often paniced spikes. Bracts very small. Young ovary pubescent. Fruit ovoid or obovoid, oblong, wood with 5-7 hard, coriaceous, narrow wins.

**Chemical constituents:** It contains Beta-sitosterol, ellagic acid and arjunic acid.

**Medicinal uses:** Bark is used as a cardio protective and cardio tonic in angina and poor coronary circulation; as a diuretic in cirrhosis of liver and for symptomatic relief in hypertension. It is used externally in skin diseases, herpes and leucoderma.

## CONCLUSION

In the traditional medicinal practice number of anti-diabetic herbal drug(s) and their formulations are

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widely used by the physicians. They are prescribed from time to time to the patients according to patient's need. Therefore many of the formulations are not well established in their scientific parameters. One such formulation is Siddha kudineer formulation "Aavarai Kudineer" which are highly prescribed but not standardized by scientific methods. Development of scientific evidence for these formulations may pave a pathway to use and or export of this potential drug globally.

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## CONFLICT OF INTEREST

The authors do not have any conflict of interest for this review work on Aavarai kudineer.

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