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HERBS USED FOR MANAGEMENT OF DIABETES IN SIDDHA SYSTEM OF MEDICINE –A REVIEW

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ABSTRACT

Globally, medicinal plants are recorded as around 6000 species and they are issued in medical and ethno-botanical literature in India; more than 600 species are commonly used in Siddha. As per the WHO, diabetes mellitus (DM) is defined as a heterogeneous metabolic disorder characterized by common features of chronic hyperglycemia with disturbance of carbohydrate, fat, and protein metabolism. Type 1 diabetes, Type 2 diabetes, Hybrid forms of diabetes -slowly evolving immune-mediated diabetes of adult's ketosis-prone type 2 diabetes, Unclassified diabetes, and Maturity-onset diabetes of the young (MODY) is a clinically heterogeneous category of disorders characterized by non-ketotic diabetes mellitus, an autosomal dominant mode of inheritance. These incorporate diabetic ketoacidosis (DKA) and non-ketotic hyperosmolar state (NKHS). While the first is seen essentially in individuals with type 1 DM, the latter is prevalent in people with type 2 DM. Both disorders are associated with absolute or relative insulin deficiency, volume depletion, and change in the mental state. The other names of diabetes mellitus in Siddha are *Madumegam, Inippu neer*. The diseases' symptoms are an urge to micturition often and the presence of flies and ants in place of urination. According to Classical Siddha, literature is the decoction prepared from herbs called *"Avaarai kudineer"* from *Cassia auriculata* from *"Theran Kudineer* 100", polyherbal formulation. Most medicines are prepared based on polyherbal formulations and other preparations, lifestyle modifications, and diet that strengthen the seven physical constituents are indicated for these diseases. Siddha medicine plays a vital role in maintaining

health through its unique herbs, herbal preparations, and other medicines possessing anti-diabetic properties.

KEYWORDS: Diabetes mellitus, Siddha, *Madumegam*, Medicines, anti-diabetic herbs.

INTRODUCTION

Globally, medicinal plants are recorded as around 6000 species and they are issued in medical and ethno-botanical literature in India; more than 600 species are commonly used in Siddha.[1] As per the WHO, diabetes mellitus (DM) is defined as a heterogeneous metabolic disorder distinguished by the common quality of chronic hyperglycemia with disruption of carbohydrate, fat, and protein metabolism.[2] The heterogeneous cause includes deficiency in insulin secretion, insulin action, or both. The long-term specific complications of diabetes develop gradually. The complications may be life-threatening and include retinopathy, nephropathy, and neuropathy. People with diabetes are at risk of other diseases like cardiac, peripheral arterial, stroke, cataracts, erectile dysfunction, and nonalcoholic fatty liver disease.[3] Diabetes may present with characteristic symptoms such as dehydration, polyuria, cloudiness of vision, and weight reduction. Genital yeast infections frequently occur in diabetic persons. The most serious clinical presentations are ketoacidosis or a non-ketotic hyperosmolar state that may lead to lack of hydration, coma, and in the absence of effective treatment, death.[4] Worldwide in 2014, the number of individuals with diabetes is continuously rising, with WHO evaluating there were 422 million adults with diabetes. The age-adjusted prevalence in adults rose from 4.7% in 1980 to 8.5% in 2014, with a considerable rise in low and middle-income countries in contrast to high-income countries.[5] It is now generally constituted that the underlying characteristic that is regular to all forms of diabetes is the defective or destruction of pancreatic β-cells.[6-9]

CLASSIFICATION OF DIABETES MELLITUS

Diabetes mellitus is classified as

- Type 1 diabetes
- Type 2 diabetes
- Hybrid forms of diabetes
  - slowly evolving immune-mediated diabetes in adults
  - ketosis-prone type 2 diabetes
- Unclassified diabetes.[10]

Type 1 diabetes

Type1 diabetes is mainly of β-cell destruction that gives to absolute insulin deficiency mostly transmitted immunologically.[11] At the time of classical clinical presentation with T1DM, there is a small or absence of insulin secretion presented by very low or undetectable levels of C-peptide in blood or urine.[12]

Type 2 diabetes

Diabetes of this type is mainly with insulin resistance in about concerning insulin deficiency. There is a largely secretory defect with insulin resistance. It is often related to other diseases i.e. metabolic syndrome.[11]

Hybrid forms of diabetes

Efforts made to Differentiate T1DM among adults have resulted in proposed new disease grouping and nomenclatures, including slowly evolving immune-mediated diabetes and ketosis-prone T2DM.[13]

Unclassified

Until there is a specific diagnosis of the type of diabetes, a classification of "unclassified" should be used, and trying to classify the type of diabetes should continue to assist in appropriate management decisions.[4]

Maturity Onset Diabetes of the Young (MODY)

Maturity-onset diabetes of the young (MODY) is a clinically heterogeneous category of disorders characterized by non-ketotic diabetes mellitus, an autosomal dominant mode of inheritance, onset usually before 25 years of age and frequently in childhood or adolescence, and a primary defect in pancreatic b-cell function.[14,15]

The causes of risk factors that have changeable diseases like obesity, hyperlipidemia, and consumption of alcohol and tobacco (Barik et al., 2016).

ACUTE AND CHRONIC COMPLICATIONS

These incorporate diabetic ketoacidosis (DKA) and non-ketotic hyperosmolar state (NKHS). While the first is seen essentially in individuals with type 1 DM, the latter is prevalent in people with type 2 DM. Both disorders are associated with absolute or relative insulin deficiency, volume depletion, and change in the mental state. Cerebral edema, and very serious complication, is seen most often in children. NKHS is most commonly seen in

elderly people with type 2 DM. Its most eminent features include polyuria, orthostatic hypotension, and a variety of neurological symptoms including altered mental state, lethargy, dulled, seizure, and possibly coma. Chronic complication includes retinopathy, nephropathy, and neuropathy.[16]

SIDDHA CLASSIFICATION OF DIABETES MELLITUS

The other names of diabetes mellitus in Siddha are *Madumegam, Inippu neer.*

The disease symptoms are an urge to micturition often and the presence of flies and ants in place of urination while boiling it gives the fragrance of sugar, and there is and reduction in the body weight. The cause for it is described in *'Nadi Nool' as "Kanni mayakathal kanndidum megam"* and *"Kiranthi punniranna mega keesaganenum thunmaarganrunthi" in 'Maruthu bharatham'*. Eat to excess; lethargy, psychological disorders, hereditary, etc. are important causes of the diseases. The chief medicines according to Classical Siddha literature are the decoction prepared from herbs called *"Avaarai kudineer"* from *Cassia auriculata* from *"Theran Kudineer* 100", polyherbal formulation added with buttermilk, holding the principle herb *Strychnos potatorum (Thettran kottai)* that flooding of the disease can be cured and *Seenthil (Tinospora cordifolia) podi*, *Naval (Syzygium cumini) podi*, *Sandhana (Santalum album) podi*, etc. Most medicines are prepared based on polyherbal formulations and other herbo-mineral and mineral preparations, lifestyle modifications, and a kind of diet that strengthens the seven physical constituents are also indicated for these diseases.[17]

HERBS AS SUBSTITUTE FOR ANTIDIABETIC AGENT IN SIDDHA SYSTEM

Worldwide there is increasing in the use of medicinal plants for long-term use and with fewer side effects. Generally, plants possess several active constituents in the secondary metabolite such as alkaloids, phenol, glycosides, flavonoids, tannins, and terpenoids responsible for different biological effects (Akinyemi et al. 2018). Medicinal plants are used in the treatment of diseases since ancient times (McGaW et al., 2019). WHO (World Health Organization) has issued guidelines such as Guidelines for the assessment of herbal medicines; and Research guidelines for evaluating herbal medicine safety and efficacy of it. Worldwide the data on the quantity and quality of the traditional medicine safety and efficacy is sufficient to meet the required criteria.[18] The important anti-diabetic herbs are.

Cassia auriculata (Avarai)

Family and Habitat: Caesalpiniaceae. The English name is mature tea tree. It grows wild in the central provinces, western coast, South India, and Ceylon.

Parts used: The leaves, flowers, bark, root, seeds, and gum.

Constituents: Bark contains mostly tannins.

Actions: Seeds are refrigerant and attenuant; bark is astringent and tonic. Root as a decoction is used as an alterative.

Uses: Decorticated seeds in a fine powder or paste used in local applications to purulent ophthalmic or conjunctivitis known as "country sore eye". Seeds with testa are finely powdered and are blown into the eyes or the powder with gingelly oil is used for sore eyes. Seeds are powder also used in diabetes and urine looks like body fluid. The twigs in the form of powder mixed with honey or the decoction, especially the flower and buds administered for chylous urine and diabetes with excellent results. Twigs are used as toothbrushes. In the South of Ceylon, a substitute for tea is made from the leaves; a substitute for coffee is made from seeds, or leaves are usefully prescribed in giddiness due to heart diseases.[19a] The whole plant is used for all kinds of urinary diseases and the five parts of the plant such as the leaf, flower, unripe fruit, bark, and root prescribed for diabetes, leucorrhea, wounds, steatorrhea, bone-related fevers, excessive thirst, etc. The gum, flower, and whole plant are particularly mentioned for diabetes. The syrup made from the flower is specified for leucorrhea, urinary disorders, and night emission.[20a]

Syzygium cumini (L) Skeels (Naval)

Family and Habitat: Myrtaceae. It grows throughout India. It has many varieties such as white, black, pit, etc.

Parts used: All the parts are used.

Constituents: Glucoside, anthocyanins, isoquercetin, kaemferol, ellagic acid, and myercetin.[21]

Actions: Astringent, stomachic, diuretic, and tonic.

Uses: Bark is indicated for diseases of mouth, cough, cold, menorrhagia, and some diseases in children. The root is mainly prescribed for *vatha* diseases, skin diseases, diabetes, dysentery, and fever. Decoction prepared from the bark is administered for diabetes, diarrhea, and stomatitis, it can be used as gargle water. The juice obtained from the bark is the potent antidote for *Strychnous nux-vomica*. The peel of the fruit in any way is to treat excessive thirst and polyuria. The root-soaked water is used is administered for diabetes and diarrhea. It is a coolant and aphrodisiac.[20a]

Tinospora cordifolia (Seendil)

Family and Habitat: Menispermsceae, occurs in almost all districts of Madras presidency.

Parts used: Leaf, climber, root tuber.

Constituents: Berberine, bitter substance, apeginin, diosmetin, genkwanin, cycloeucalenol.[21]

Actions: antiperiodic, alterative, diuretic. Stem and root are bitter, aphrodisiac, demulcent, stimulant (hepatic), and tonic.

Uses: Used in scorpion-sting. Watery extract of the plant treated as febrifuge called "Indian quinine". The root is valuable in treating debilitating diseases, intermittent fever, and dyspepsia.[19b] The decoction of the plant is given for *pithasuram*, fevers. The preparation called '*seendil sarkarai*' from the text *Theran venpa* prescribed for syphilis eighteen types of skin diseases, elephantiasis, frightful *kaba* diseases. This plant is mainly used in the treatment of polydipsia in diabetes, etc.[20b]

Strychnos potatorum (Thettran)

Family and Habitat: Loganiaceae. Belonging to Bengal, Central and plentiful in southern India and Burma.

Parts used: Fruit and seeds.

Constituents: Seeds contain brucine.

Actions: Alterative, tonic, stomachic, and demulcent.

Uses: Powder of the seeds is given internally with milk to irritation of the urinary organs and in gonorrhea. It is also used as a remedy for diabetes. Powdered seed mixed with honey is applied to boils to hasten suppuration. Pulp is a good substitute for ipecacuanha in the treatment of dysentery and bronchitis. It is also regarded as a remedy for diabetes.[19c] The peel of the fruit consumed in any way cures heart-related diseases. Seed powder is mixed with milk to treat diabetes and urinary tract infections.[20c]

Benincasa hispida (Kaliyana- pushnik- kay)

Family and Habitat: Cucurbitaceae. It is planted mainly in gardens throughout India.

Parts used: Seeds, fruit, and fruit juices.

Constituents: Fixed oil, starch, alkaline cucurbitine, an acid resin, proteids, myosin, vitellin, sugar.

Actions: Fruit is nutritive, tonic and diuretic, also alterative, styptic, and valuable anti-mercurial. Fruit covering is a potent vermifuge.

Uses: Seeds are useful in tinea. Fresh juice of the fruit is administered internally specific for hemoptysis and other hemorrhages from the internal organs. It is a potent antidote for alcoholic poisonings. In diabetes, the juice of the cortical portion with powdered saffron and red rice bran grains had given morning and evening with a strict diet.[19d] It is given internal fevers, toddies like the staging of diabetes, antidote, skin diseases, and psychological disorders. A medicine called 'kushmandagirtham' prepared from is mentioned for tuberculosis.[20d]

Ficus benghalensis (Alamaram)

Family and Habitat: Moraceae. It is a well-known tree in the lower Himalayas and is now found all over India.

Parts used: Milk juice, bark, leaf, fruit, root, flower

Constituents: Bark and young buds contain tannin, wax, etc. Fruit contains oil, albuminoids, carbohydrates, and fiber.

Actions: Bark is tonic, astringent, cooling, dry, and diuretic. Seeds or fruits are cooling and tonic. Young buds and milky juice are astringent. It is one of the four potent astringents as in Siddha.

Uses: Milky juice and seeds or fruits are useful as external to pain, bruises, sores, and ulcers, in rheumatism and lumbago. An infusion of the bark is particular in reducing blood sugar in diabetes, dysentery, hemorrhagic fluxes, gonorrhea, and seminal weakness.[19e] It strengthens the teeth, coolant, vitiligo, leucorrhea, and stomatitis. The bark decoction is administered for oral diseases. The soaked water of the bark is treated for diabetes mellitus.[20e]

Terminalia arjuna (Maruthu)

Family and Habitat: Combretaceae. It is found in the lower Himalayas, Bihar, Bengal, Chota-Nagpur, Burma, Central, and Southern India, and Ceylon.

Parts used: Leaf, fruit, seed, bark.

Constituents: Bark contains tannin including glucotannic acid, a coloring matter, a glucosidal body, and ash of it containing pure calcium, sodium, carbonate, and traces of alkaline chlorides.

Actions: Tonic, astringent, and cardiac stimulant.

Uses: The decoction of the bark is astringent and acts as a cardiac stimulant, tonic, and lithontriptic, and also used in hemorrhages, diarrhea, dysentery, and sprue. It is useful in bilious affections, and as an antidote to poisons, also in scorpion bites. The decoction

prepared from it is highly recommended for heart diseases complicated with endocarditis, mitral regurgitation, pericarditis, and angina. The mixture of bark, milk, and sugar in an empty stomach for a particular time is administered for the entire removal of all distressing symptoms.[19f] It is prescribed for diabetes mellitus, leucorrhea, giddiness, thirst, fever, and excruciating diseases. It is a cardiac tonic. The paste of the boiled fruit is applied externally for fatal wounds. The bark decoction is stated for asthma, diarrhea, and fevers.[20f]

Several other plants species possessing anti-diabetic properties are *Acacia arabica, Aegle marmelos, Allium cepa, Allium sativum, Aloe vera, Berberis asiatica, Brassica juncea, Citrullus colocynthis, Capparis spinosa, Carissa carandas, Coccinia grandis, Curcuma longa, Cyperus rotundus, Embelia ribes, Enicostema axillare, Erythrina variegata, Gymnema slyvestre, Momordica charantia, Phyllanthus amarus, Phyllanthus emblica, Pterocarpus santalinus, Pterocarpus marsupium, Rheum emodi*, etc.[22]

CONCLUSION

In the conclusion, however, growing access to insulin alone will not solve the diabetes burden. Improving access to medicine and applied science is complex, but only part of the wider challenge of improving disease prevention efforts, reaching health care, and strengthening the health system.[23] are very much important these days. Several herbs have shown anti-diabetic activities such as increasing insulin sensitivity, hypoglycemic effects, etc. Worldwide there is increasing in the use of medicinal plants for long-term use and with fewer side effects. Siddha medicine plays a vital role in maintaining health through its unique herbs, herbal preparations, and other medicines with anti-diabetic properties are briefly explained in this review and along with it the adoption of a healthy lifestyle that supports the management of metabolic diseases like diabetes mellitus.

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