

# Ethnomedicine: A Potential Alternative Approach against Diabetes in India and Abroad

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**Abstract:** The rich ethnomedicinal heritage of the earth might have the potential to cure the very common disease, diabetes. In the following review, floras from parts of India, mostly from Tamil Nadu and Kerala have been studied. Plants like *Azadirachta indica* A. Juss., *Gymnema sylvestre* R. Br., *Allium cepa* Linn., *Momordica charantia* L. etc. have been seen to be widely used in several places and also across different countries. So, they must have some anti-hyperglycaemic activity. In ethnomedicine, we are not proving anything new. The medicines prepared from these ethnic sources are somehow effective and hence, tribes had been using them for years. Through this paper, we will try to identify and study more plants and make people aware of them.

**Keywords:** Ethnomedicine, Ethnobotany, Herbal medicine, Diabetes

## 1. Introduction

In today's world Diabetes has been no less than an Urban Monster, eating away millions every year. According to the data of World Health Organization, around 1.6 million deaths occurred around the globe due to direct impact of diabetes on 2016. Also, the number of diabetic patients has increased nearly four folds if compared to the data of 1980. At present, around 415 million of people are estimated to live with diabetes.

Diabetes is taking a huge toll in the developing and the poor countries. It affects the kidney directly and also leads to multiple diseases. The financial fight against the disease is also not so economy friendly. With such high impact across the globe and with so little to do, people should think for ideas and alternative ideas and remedies for this disease, which may execute slow, painful death.

The globe is rich with floras and faunas. The ethnobotany of many countries has notable historical background, such as Ayurveda of India or Persian-Arabic system of medicine, Unani and so on. It is very much expected that they might have some remedies against common diseases like diabetes.

## 2. Ethnobotany of Anti-diabetic medicines

### 2.1 Ethnobotanical Status of Indian Subcontinent

According to WHO's data of 2013, around 63million people of India were estimated to be diabetic. India is among the ancient civilizations of the globe, and throughout the map, there are many tribes still existing where the touch of modern-day civilization never reached. Their practices of medicines are still indigenous, and thus, the medicines are still made from herbs or extracts from animal parts.

In Tamil Nadu, village dwellers from Kumaragiri Hills of Salem district used *Cassia auriculata* L. in treating diabetes. Diabetes was also treated by a grass *Chloris barbata* SW. Along with honey, leaf decoction of *Coccinia indica* could also be taken for curing diabetes. For diabetes, crude extracts

of the plant *Cyanodon dactylon* Pers. were also medicated. Also, anti-diabetic activities had been found in seed powder of *Ficus glomerata* Roxb. (along with honey); leaf decoction of *Gymnema sylvestre* R.Br. and fruits of *Syzygium cumini* L. [1]

The traditional ethnomedicine practices from the people of Tamil Nadu don't end on the previous paragraph. The village dwellers from Sivagangai District had their own means of treating diabetes. Powders of dried leaves of *Gymnema sylvestre* (Retz.) R. Br. ex Roemer & Schultes. were processed to make medicines for diabetes. They also treated rhizome of *Curcuma longa* auct. non L. the same way to prepare medications. The villagers also ate the flower of *Cassia auriculata* L. and leaves of *Andrographis paniculata* (Burm. f.) Wallich ex Nees directly. Also, people suffering from the disease might regularly intake ripe fruits of *Coccinia grandis* (L.) J.Voigt. Along with milk or honey, intake of dried and powdered fruits of *Caesalpinia pulcherrima* (L.) Sw. could also be beneficial for health. Hands and legs were massaged with paste made from the leaves of *Crateva religiosa* auct. non Forster f. Along with milk, powdered stem barks of *Ficus benghalensis* L. or a powdered mixture of leaves of *Azadirachta indica* Andr. Juss. and fruits of *Carum nothum* were also drunk. Decoction from leaves of *Azadirachta indica* Andr. Juss. and *Phyllanthus amarus* Schum. & Thonn. were also medicated. [2]

The ethnomedicines for diabetes used by the Malayali tribes of Chitteri Hills, also from Tamil Nadu, are here as follows. There, patients diagnosed with diabetes were fed with powdered leaf of *Aegle marmelos* (L.) Corr. or leaf decoction of *Allium cepa* Linn. or leaf powder of *Andrographis lineata* Wall. ex Nees, mixed with cow's milk in all the cases. Diabetes treatment can also be done with leaves of *Allium sativum* Linn., *Azadirachta indica* A. Juss., *Bombax ceiba*, *Cuminum cyminum* Linn., *Erythrina indica* Lam., *Euphorbia antiquorum* Linn., *Gymnema sylvestre* R.Br., *Hibiscus rosa-sinesis* Linn., *Lantana camara* Linn., *Murraya koeingii* (L.) Spreng., *Ocimum santum* L. Seeds of plants like *Acacia arabica* (Lam.) Willd., *Brassica juncea* (Linn.) Czern. & Coss., *Cajanus cajan*(Linn.) Millsp., *Ficus*

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*benghalensis* Linn., *Mangifera indica* L., *Syzygium cumini* (L.) Skeels. were also used in the treatment of diabetes. People also founded cures of diabetes in flower extracts of *Cassia auriculata* Linn., boiled tubers of *Ipomoea batatas* (Linn.), fruits of *Momordica charantia* L. & *Punica granatum* L. and so on. [3]

Again, in the Sirumalai hills of Tamil Nadu, the Palliyar tribes show extensive uses of traditional medicines against diabetes. According to them, boiled water extracts of root barks and flowers of *Casearia tomentosa* Roxb. and *Cassia fistula* Linn. respectively were used in treating diabetes. Fruits of *Coccinia grandis* (Linn.) Voigt or *Momordica charantia* Linn. proved useful for the tribe. Processed stem barks of *Ficus benghalensis* Linn. and *Garuga pinnata* Roxb. might also provide a good remedy against diabetes. The decoction of entire *Hybanthus enneaspermus* (Linn.) F. V. Muell. plant or roots of *Hemidesmus indicus* (Linn.) R. Br. might also provide fruitful results. A mixture of leaf extracts of *Premna latifolia* Roxb. along with milk of cow had also been used. Seeds and stem bark of the plant *Syzygium cumini* (Linn.) Skeels could be also used to provide common medication for the people of Sirumalai hills suffering from diabetes. [4]

Also, from the Nalamankadai Village of Chitteri Hills situated in the Dharmapuri District of Tamil Nadu, data were collected. The ethnic people who resided there used leaves of *Andrographis lineata* Wall. ex Nees., *Allium cepa* Linn., *Erythrina indica* Lam., *Gymnema sylvestris* R.Br., *Hibiscus rosa-sinensis* Linn., *Ipomoea batatas* (Linn.) Lam., *Murraya koeingii* (L.) Spreng., *Azadirachta indica* A. Juss., *Ocimum santum* L. for treatment of diabetes. Diabetes was also treated with seeds of *Syzygium cumini* (L.) Skeels., *Trigonella foenum-graecum* L., *Acacia arabica* (Lam.) Willd., *Bombax ceiba* L., *Brassica juncea* (Linn.) Czern. & Coss. and *Cajanus cajan* (Linn.) Millsp. Tubers of *Jatropha glandulifera* Rox. was also known to the village dwellers for the antidiabetic abilities. They also used kernel of *Mangifera indica* L. for curing diabetes. [5]

The south Indian ethnomedicinal hub did not end with Tamil Nadu. There are districts of Kerala also, thoroughly studied. The village dwellers used hard woods extracts and nuts of the plant *Acacia catechu* W&A. for treating diabetes. [6]. Leaves of the plant *Aegle marmelos* Corr. were used to prepare medication for diabetes [7]. Village dwellers, when affected with diabetes regularly ate the boiled extracts of roots of plants like *Rubia cordifolia* Linn. [8], *Salacia beddomei* Gamb. [9], *Salacia fruticosa* DC. [10], *Salacia macro sperma* Wt. [11], *Salacia oblonga* Wall. [12], *Salacia prinoides* DC. [13], *Tragia involucrate* Linn. [14] and *Salacia reticulata* Wt. [15]. Boiled extract of bark of *Azadirachta indica* A.Juss. had also been found useful. [16]. Extracts from rhizomes of *Alpinia calcarata* Rosc. were often medicated during diabetes treatment. [17]. According to them, juice of leaves of *Stroblanthus hyneanus* Nees. were also proved beneficial. [18]. The ethnic people also found that the flower and bark of the plant *Saraca indica* Linn. were also helpful for the treatment of diabetes. [19]. Extracts of the whole plant of *Mimosa pudica* Linn. [20] and also of *Coccinia indica* W&A. [21] had also been proved

effective according to these people. People also ate green fruits from *Momordica charantia* Linn. [22] and also fruit extracts from *Benincasa hispida* Thunb. [23]. Extracts prepared from *Tinospora cordifolia*, *Curcuma longa* and *Embllica officinalis* were mixed and were eaten together before intaking any food. [24]. In the treatment of ulcers caused from diabetes, application of plant juice obtained from *Cynodon dactylon* Pers. is used along with floral extracts of *Lucas aspera* were used. [25]. The bark extracts from the plant, *Ficus gibosa* Bl. is said to have antidiabetic properties and were also used to cure ulcers. [26]. Extracts from leaves of the plant *Gymnema sylvestris* R. Br. were also very much known to the people as a treatment against diabetes. [27]. The boiled extracts of root barks of *Helicteres isora* Linn. [28] and the roots extracts from *Holostemma annulare* K.Schum. [29] were also said to be effective against diabetes according to those people residing there. Traditional healers also prescribed *Hordeum vulgare* Linn. for diabetes. [30].

Extensive data had also been noted from another rich ethnomedicinal hub, the northeast India, especially in Thoubal district of Manipur. It is the home to lots of tribes. Along with milk, Loi community used to eat the leaves of *Aegle marmelos* (Linn.) (directly) or *Catharanthus roseus* (Linn.) (decoced); the Loi tribes also use plants like *Ocimum americanum* Linn. (petiole), *Catharanthus roseus* (Linn.) (heated leaf juice) etc.; against diabetes Meitei tribes used plants like *Cassia alata* Linn. (decoced leaves), *Azadirachta indica* A. (bark), *Artocarpus lakoocha* (bark), *C. viscosum* Vent. (leaves), *Coix lacrymajobi* Linn. (roots), *Hygrophila phlomoides* Nees., *F. pomifera* Wall. (leaves and fruits), *G. macrophylla non.* G. Don., and so on for their antidiabetic effects. There was also Meitei-Pangal ethnic tribes studied, and they also were found to use a vast number of plants for their antidiabetic properties. The plants they used for medication are *Ardisia colorata* Roxb. (heated leaf juice), *Averrhoa carambola* Linn. (roots), *C. didymbotrya* Fresen. (heated leaf juice), *Centella asiatica* (Linn.) (bark decoction), *Cyperus esculentus* Linn. (heated tuber juice), *Ficus hispida* Linn. (leaf), *Hibiscus syriacus* Linn. (crude leaf extracts), *Imperata cylindrical* (Linn.) (root decoction), *Ipomea aquatica* Forssk. (young shoots), *Nelumbo nucifera* Gaertn. (young shoot juice) and many more. [31] Some important anti-hyperglycemic ethnomedicines have been described in Table 1.

**Table 1:** Indian Ethnomedicinal plants against Diabetes

Species	Place	Plant part used
<i>Coccinia indica</i> [1]	Kumargiri Hills, Salem Tamil Nadu	Leaf
<i>Cyanodon dactylon</i> Pers. [1]	Kumargiri Hills, Salem Tamil Nadu	Whole Plant
<i>Ficus glomerata</i> Roxb. [1]	Kumargiri Hills, Salem Tamil Nadu	Seed
<i>Gymnema sylvestris</i> R.Br. [1]	Kumargiri Hills, Salem Tamil Nadu	Leaf
<i>Syzygium cumini</i> L. [1]	Kumargiri Hills, Salem Tamil Nadu	Fruit
<i>Curcuma longa</i> auct. non L. [2]	Sivagangai District, Tamil Nadu	Rhizome
<i>Cassia auriculata</i> L. [2]	Sivagangai District, Tamil Nadu	Flower

	Nadu	
<i>Andrographis paniculata</i> (Burm. f.) Wallich ex Nees. [2]	Sivagangai District, Tamil Nadu	Leaf
<i>Coccinia grandis</i> (L.) J.Voigt. [2]	Sivagangai District, Tamil Nadu	Fruit
<i>Ficus benghalensis</i> L. [2]	Sivagangai District, Tamil Nadu	Stem bark
<i>Azadirachta indica</i> Andr. Juss. [2]	Sivagangai District, Tamil Nadu	Leaf
<i>Allium cepa</i> Linn. [3]	Chitteri Hills, Tamil Nadu	Leaf
<i>Momordica charantia</i> L. [3]	Chitteri Hills, Tamil Nadu	Fruit
<i>Acacia arabica</i> (Lam.) Willd. [3]	Chitteri Hills, Tamil Nadu	Seed
<i>Casearia tomentosa</i> Roxb. [4]	Sirumalai Hills, Tamil Nadu	Root bark
<i>Cassia fistula</i> Linn. [4]	Sirumalai Hills, Tamil Nadu	Flower
<i>Syzygium cuminii</i> (Linn.) Skeels. [4]	Sirumalai Hills, Tamil Nadu	Stem bark
<i>Coccinia grandis</i> (Linn.) Voigt. [4]	Sirumalai Hills, Tamil Nadu	Fruit
<i>Hybanthus enneaspermus</i> (Linn.) F. V. Muell. [4]	Sirumalai Hills, Tamil Nadu	Whole plant
<i>Andrographis lineata</i> Wall. ex Nees., [5]	Nalamankadai Village, Dharmapuri District, Tamil Nadu	Leaf
<i>Cajanus cajan</i> (Linn.) [5]	Nalamankadai Village, Dharmapuri District, Tamil Nadu	Seed
<i>Jatropha glandulifera</i> Rox. [5]	Nalamankadai Village, Dharmapuri District, Tamil Nadu	Tubers
<i>Mangifera indica</i> L. [5]	Nalamankadai Village, Dharmapuri District, Tamil Nadu	Kernel
<i>Aegle marmelos</i> (Linn.) [31]	Thoubal District, Manipur	Leaves
<i>Ocimum americanum</i> Linn. [31]	Thoubal District, Manipur	Petiole
<i>Azadirachta indica</i> A. [31]	Thoubal District, Manipur	Bark
<i>Coix lacrymajobi</i> Linn. [31]	Thoubal District, Manipur	Root
<i>Cyperus esculentus</i> [31]	Thoubal District, Manipur	Tuber
<i>Ipomea aquatica</i> Forssk. [31]	Thoubal District, Manipur	Young shoots

### 3. World-wide status

#### 3.1 Bangladesh

Bangladesh was an integral part of India throughout history. So, a strong knowledge of ethnomedicines could always be expected. Among the people in the Bheramara Area of Kushtia District, practiced of ethnomedicines to treat diabetes was noted. They fed on ripe fruits from the plant *Diospyros discolor* Willd. as a medicine against diabetes. Decoction of the plant, *Asparagus racemosus* Willd. was also drunk. [32]

Also, the Marakh Sect of Garo tribe of Mymensingh District practiced different ethnomedicines while curing diabetes. Leaves of plants like *Alstonia scholaris* (L.) R.Br. (chewed

raw), *Catharanthus roseus* (L.) G. Don. (after decoction), *Enhydra fluctuans* Lour. (decoked), *Coccinia grandis* (L.) J. Voigt., *Momordica charantia* L.(extract), *Phyllanthus emblica* L.(juice), *Clerodendrum viscosum* Vent. were used in treatment of diabetes. Diabetes was also treated by intaking roots and barks of *Lannea coromandelica* (Houtt.) Merr. Taking fruits from the plants *Terminalia chebula* Retz. and *Syzygium aqueum* (Burm.f.) Alston. were also proved fruitful. Stem of *Drynaria quercifolia* (L.) J. Smith. & *Cuscuta reflexa* Roxb. (both crushed) were also eaten for there antidiabetic abilities. [33]

#### 3.2 Trinidad and Tobago

Long distance away from India and Bangladesh is Trinidad and Tobago, located in the northern part of the South America. The island country which was pretty unknown to the rest of the world till the medieval period, had a strong knowledge on ethnomedicines. They used leaves of *Kalanchoe pinnata*, *Laportea aestuans*, *Gomphrena globosa*, *Bontia daphnoides*, *Bixa Orellana* for treating diabetes. Flowers and shells of *Cocos nucifera* were also used. Diabetes was also treated with whole plant extraction of *Momordica charantia* or *Phyllanthus urinaria*. Vines of *Antigonon leptopus* were also found effective against diabetes. They also treated early diabetic stages with *Spiranthes acaulis*. [34]

#### 3.3 Iran

Back in Asia, in Urmia of Northwest Iran, practice of antidiabetic ethnomedicines by the ethnic healers had been reported. Flowering offshoots of plants like *L. album* L., *Nepeta bracteata* Benth., *Nepeta meyeri* Benth., *Salvia nemorosa* L., *T. polium* L., *Trifolium pratense* L. and *Trifolium purpureum* Loisel. had used to prepare medicines. In the treatment of diabetes, leaves of plants like *Arctium lappa* L., *Coronilla varia* L., *Nasturtium officinalis* (L.) R. Br., *Teucrium orientale* L. had been also used. Fruits of *Berberis integerima* Bunge., *Cerasus microcarpa*, *C. colocynthis* (L.) Schrad., *Crataegus aronia* (L.) Bosc ex Dc., *Rhus coriaria* L., *Rumex sculantus* L. had also been found effective against diabetes. [35]

### 4. Discussion

The review aims to compile at least some species of plants, which were identified by the tribes and ethnic communities for having some roles against diabetes. The ethnic people from southern India seemed alarmingly conscious against diabetes, its negative effects, its diagnosis and its cure. To create a contrast in studies, we chose three foreign countries, one from east (Bangladesh), one from middle-east (Iran), and lastly from South America (Trinidad and Tobago). Diversity in ethnomedicinal plants had been observed significantly as the vegetation surely differs. This created a wider and a better scope for analysis.

From this review, we may get a generalized and brief ideas about many plants in India and abroad and hence, we can do their phytochemical analysis and see their biological



activities next. Some works are still under proceedings and few works have been completed so far. For example, *Gymnema sylvestre* has phytochemical extracts which are scientifically proved to be effective against hyperglycemia. It has been shown in rats that from the leaves of *Gymnema sylvestre*, antioxidant properties can be achieved. [36] Effects of gymnemagenin and gymnemic acids have been also established in rats. [37] There are many antidiabetic medicines out in the market whose compounds are mostly made of extracts obtained from *Gymnema sylvestre*. Also, further studies are needed in many potential plants. Therefore, we can hope that we will be able make a better drug out of them, and hope for better days for the diabetics and people prone to the disease.

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