



## Review Article

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### **TINOSPORA CORDIFOLIA (WILLD.) MIERS.: NUTRITIONAL, ETHNOMEDICAL AND THERAPEUTIC UTILITY**

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#### ABSTRACT

Guduchi (*Tinospora cordifolia*) is a popular medicinal plant spread across the tropics. Its effectiveness in therapy is well known globally. Lesser known are its dietary benefits. Guduchi is being used in Diet by various tribal people of India and it also forms a part of traditional Indian cuisine. Ayurveda also states its dietary utility. The various benefits acquired by the use of Guduchi as a dietary component have been reviewed and discussed in this article.

**Keywords:** Guduchi, *Tinospora cordifolia*, Diet, Ayurveda, Ethnomedicine, Tribal uses.

#### INTRODUCTION

*Tinospora cordifolia* belonging to the family Menispermaceae is well known in Ayurveda as Guduchi. It is an important drug used by Ayurveda practitioners in various diseased conditions and also for maintenance of health. A majority of the Ayurvedic lexicons admire the potential health benefits of this drug and compare it to the celestial nectar which brings about immortality, hence the name Amruta is attributed to this. It is a famed rejuvenator and nootropic, used very commonly in treatment of ailments such as fever, diabetes and skin disorders<sup>1</sup>. Though very renowned, lesser known are its utility in food and nutrition. The classification of food articles in Ayurveda is found to be into different vargas or groups based on the type of food. One such group is Shaka varga dealing with vegetables. This Shakavarga is sub divided into different groups based on the part used viz. leaves (Patra shaka), fruits (Phala shaka), tubers (Kanda shaka) etc<sup>2</sup>. Guduchi, under the name Vatsadani (a synonym to Guduchi), is mentioned as one among the Patra Shakas<sup>3,4</sup>. This indicates that the leaves of Guduchi were used as a vegetable by ancient Indians. The current paper is a review of its nutritive utility and importance as a dietetic in certain diseases.

#### Vernacular Names

**Sanskrit:** Guduchi, Amrita

**Bengali :** Golancha

**English :** Tinospora

**Gujarati :** Gulvel

**Hindi :** Gulancha

**Kannada:** Amrutaballi, Madhuparni

**Malayalam :** Amrytu, Chittamritam

**Oriya :** Gulochi

**Tamil :** Amudam, Chindil

**Telugu :** Tippateege, Guricha

**Urdu :** Gilo, Satgilo

#### Taxonomic Classification

**Kingdom :** Plantae – Plants;

**Subkingdom :** Tracheophyta – Vascular Plants;

**Super-division:** Spermatophyta – Seed bearing plants;

**Division:** Magnoliophyta – Flowering;

**Class :** Magnoliopsida – Dicotyledons;

**Subclass:** Polypetalae – Petals are free;

**Series :** Thalamiflorae – Many stamens and flower hypogynous;

**Order :** Ranales

**Family :** Menispermaceae – The Moonseed family;

**Tribe :** Tinosporeae

**Genus :** Tinospora

**Species :** *cordifolia*

#### Synonyms of Guduchi

**Guduchi** - That which protects.

**Amruta** - That which can act similar to the celestial nectar which can make the person immortal.

**Chakrangi, Chakralakshanika** - Referring to the radiating medullary rays visible on transverse section.

**Chinnaruha, Chinnodbhava** - Referring to its propagation by stem cuttings.<sup>5</sup>



Figure 1: The habitat of *Tinospora cordifolia* (Willd.) Miers.



Figure 2: The stem pieces of *Tinospora cordifolia* (Willd.) Miers.

### Botanical Description of Guduchi

*Tinospora cordifolia* is a popular traditional medicine distributed throughout the tropical region of India up to 1200 m above sea level from Kumaon to Assam, in north extending through West Bengal, Bihar, Deccan, Konkan, Karnataka and Kerala, India. It is a fairly common plant of deciduous and dry forests, growing over hedges and small trees<sup>6</sup>. It is a glabrous, succulent, climbing shrub, often attaining a great height and sending down long thread like aerial roots. The plant seems to be particularly found climbing up the trunks of large Neem trees. The aerial roots that arise from the mature branches or cut bits of stems grow downward and by continuously lengthening sometimes reach the ground. They thicken gradually and resemble the stems, except for the absence of nodal swellings. The fresh or tender stems are greenish, longitudinally striated ribbed. The bark is grey of creamy-white in color, deeply cleft with spiral and longitudinal clefs, the space between the clefs being usually dotted with large rosette like lenticels. The branches bear smooth heart shaped leaves<sup>7</sup>. Leaves are simple, alternate, exstipulate, long petiolate, chordate in shape showing multicoated reticulate venation. Flowers are small and unisexual where male flowers are in clusters and female flowers are solitary. Aggregate fruit is red, fleshy, with many drupelets on thick stalk with sub terminal style scars, scarlet coloured. Flowers grow during the summer and fruits during the winter<sup>8</sup>.

### Guduchi - Patra Shaka

Ayurveda is the science and art of life which encompasses every aspect that leads to a healthy and a long life. The fruitful practice of Ayurveda in the present era, though an ancient system, vows to the credibility and validity of this science. Alongwith medicines and treatment theorems for diseased conditions, Ayurveda emphasises on prevention of occurrence of the diseases. In this regard, there is a mention of dietary regimens to be followed by an individual so as to keep him healthy and unaffected by external factors such as weather changes, etc. A mention of various dietary articles is found in all the texts of Ayurveda classified into different vargas (Groups) based on the type of food. Guduchi, under the name Vatsadani, is mentioned as one among the Patra Shakas indicating the use of *Tinospora cordifolia* leaves as vegetable. Sushruta mentions the properties of leaves of Guduchi as that which is having Ushna veerya (producing a catabolic effect), tasting sweet and bitter and pacifying Vata (A bio-force mentioned in Ayurveda which is responsible for the movement of every macro and micro component of the body)<sup>4</sup>. Charaka includes guduchi in 8 different ganas (groups of drugs with similar action) vowing to its multifaceted action. Sandhaniya (binds the excreta), Triptighna (Removes disgust towards food), Stanyashodhana (purifies breast milk), Snehopaga (supports oleation), Trsnanigrahana (pacifies thirst), Dahaprashamana (reduces burning sensation), Prajasthapana (supports conception and pregnancy), Vayahsthapana (Anti-ageing, rejuvenating)<sup>9</sup>. A careful consideration of the above reveals that it has its action on different systems of the body such as the gastro-intestinal (Triptighna, Sandhaniya), immuno modulatory (Vayahsthapana), reproductive (Stanyashodhana, Prajasthapana), fluid metabolism (Trushna nigrahana, Dahaprashamana) etc. Hence Guduchi can be utilized in both treatment and dietetics in the above said diseases.

### Phytochemistry

The plant mainly contains alkaloids, glycosides, steroids, sesquiterpenoid, aliphatic compound, essential oils, mixture of fatty acids and polysaccharides. The alkaloids include berberine, bitter giloinin and non-glycoside giloinin gilosterol. The major phytoconstituent in *Tinospora cordifolia* includes tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin and  $\beta$ -sitosterol. Berberine, palmatine, tembertarine, magniflorine, choline and tinosporin are reported from its stem. A rearranged cadinane sesquiterpene glycoside named tinocordiside, consisting of a tricyclic skeleton with a cyclobutane ring, has been isolated from the immunomodulatory aqueous fraction of the plant. The new clerodane furano-diterpene 2 with the molecular formula  $C_{20}H_{20}O_8$  has been isolated from the stems of *Tinospora cordifolia*<sup>10</sup>. *T. cordifolia* contains high fibre (15.9 %), sufficient protein (4.5 %-11.2 %), sufficient carbohydrate (61.66 %) and low fat (3.1 %). It has high potassium (0.845 %), high chromium (0.006 %),

sufficient iron (0.28 %) and sufficient calcium (0.131 %) and important in various regulatory functions<sup>11</sup>.

### Ethno-medico-botanical and Tribal uses

Guduchi is used as an ingredient of different compound-herbal-preparations. It is also used in the traditional medicinal system of Thailand for treatment of diarrhea and has been reported to inhibit the *in vitro* growth of the intestinal protozoan parasite, *Blastocystis hominis*. *T. cordifolia* is highly valued in 'Sri Lankan' traditional medications too. Shade-dried-leaves are ground into powder and mixed with hot water and the mixture is taken orally in the treatment of diabetes by the people living in sacred-groves in Cuddalore district of Tamilnadu, India. Another interesting use is, the smashed leaf and root is added to brown sugar and taken orally at night after normal dinner as a potent aphrodisiac by the village-folk of Natore and Rajshahi districts of Bangladesh<sup>12</sup>. In tribal medicine, whole plant, powdered root and stem bark, decoction of root and stem, juice of the root, juice or paste of the leaves and stem of the *T. cordifolia* are being used to treat various ailments viz. fever, jaundice, diarrhoea, dysentery, general debility, cough, asthma, leucorrhoea, skin diseases, fractures, eye disorders, bites of poisonous insects, venomous snake etc<sup>10</sup>. National Ayurveda Dietetics Research Institute (NADRI, CCRAS, Bangalore, India) conducts local health tradition survey tours in different districts of Karnataka and the following uses of Guduchi were collected during such tours. In Davanagere District of Karnataka, India some folk healers claim to use Guduchi decoction orally in cases of Amlapitta (Hyperacidity), Indigestion and also, oral intake of Guduchi is said to alleviate leucorrhoea. The drug is considered a potent treatment against Hikka (Hiccups) by traditional healers in Bagalkot District of Karnataka, India.

### Pharmacological Activities

Guduchi is one drug which has undergone numerous experimentations for its therapeutic utility. It has shown positive activity over different systems thus encompassing the entire body. It is a Rasayana as mentioned in Ayurveda which speaks of its *in-toto* action. It has been proved to possess Anti inflammatory<sup>17</sup>, antioxidant<sup>18</sup>, anti cancerous<sup>19</sup>, cognition and memory enhancing<sup>20</sup>, aphrodisiac<sup>21</sup>, immunomodulatory<sup>22</sup> and management of vatarakta (Gouty arthritis)<sup>23</sup> effects.

### Preventive and Curative Potential of Guduchi as Food

The potential benefits of guduchi as a therapeutic agent are well known whereas its dietary utility is not very renowned. Nutritional aspects of Guduchi are of a great importance in health and disease. The practice of using the leaves as a food article promotes health, serving both preventive and curative purposes. High carbohydrate and protein contents present in Guduchi helps in providing the essential energy component yielding 292.54 Cal/100g<sup>10</sup>. Trace element presence in guduchi makes it a potential chromium and potassium supplement. The inadequate

dietary intake of Chromium causes several metabolic abnormalities including impaired glucose and lipid metabolism, elevated circulating insulin levels and decreased insulin receptor numbers. Chromium repletion improves glucose tolerance and reverses abnormal elevations in circulating insulin and glucagon<sup>13</sup>. Intake of Chromium has also shown to improve glycemic control and cholesterol levels in patients with Type II diabetes. The common intake of guduchi leaves as an anti-diabetic by people in diet is benefiting them by the action of the chromium component. Chromium supplementation also helps in relieving ataxia and peripheral nerve conduction defects<sup>14</sup>. Potassium supplementation can reduce cardiac arrhythmias and also prevent the occurrence of the same<sup>15</sup>, thus supporting the cardiac functioning. Ayurveda mentions the utility of guduchi in Hruddourbalya- as it enhances cardiac wellness. Guduchi also provides sufficient iron and calcium in accordance with the daily requirement thus preventing conditions such as Iron deficiency anaemia, dizziness, weakness, fatigue, dyspnoea and neuropsychiatric manifestations of chronic hypocalcaemia<sup>16-23</sup>. The neurological manifestations are clubbed under the name of Vatavyadhis (Diseases caused due to vitiated Vata) in Ayurveda and the authors have clearly stated about the properties of Guduchi shaka which can pacify vata<sup>3,4</sup> and hence prevent occurrence of the Vatavyadhis. Along with the particular components acting towards prevention of diseases, it can be noted that the drug is also a potent medicament for a number of diseased conditions, as understood by the pharmacological experimentation done on Guduchi. Hence it can be noted that the drug *in-toto* is considered a rejuvenator, replenishing the health of the person who consumes it.

### CONCLUSION

Even-though, there are many herbal plants in the world, Guduchi is considered to be having greater medicinal value. The pharmacological actions attributed to *Tinospora cordifolia* in Ayurvedic texts have evidences suggesting that this drug has immense potential in modern pharmaco-therapeutics. Various crude extracts from various parts of guduchi have medicinal applications from time immemorial. *Tinospora cordifolia* can be a potential dietary component which can help in prevention of different diseases. The utility of Guduchi leaves in diet is advisable and is highly beneficial.

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