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An exploration of physiological, medicinal and safety aspects of *Guduchi* (*Tinospora cordifolia*): A complete Ayurvedic and modern review

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ABSTRACT

Introduction: *Tinospora cordifolia* commonly known as "Amrita" or "Guduchi" is an important drug of Indian systems of medicine (ISM) and used in medicines since times immemorial. *Guduchi* is a Sanskrit word which means that 'which protects body from diseases'. Another name for this herb is 'Amrita', which refers to the heavenly elixir according to Hindu mythology. The drug is well known Indian bitter and prescribed in fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases and chronic diarrhoea and dysentery. It has been also indicated useful in the treatment of heart diseases, leprosy, helminthiasis and rheumatoid arthritis. It is an important drug and is used in form of different preparations like *Satva*, *Ghrita*, *Tail*, *Swarasa* etc. **Material & Methods:** For this review article *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Ashtanga Sangraha*, *Bhavprakash Nighantu*, *Raj Nighantu*, *Dhanvantari Nighantu*, *Shaligrama Nighantu*, *Priya Nighantu*, *Kaiydev Nighantu*, *Madanpal Nighantu*, *Shodhal Nighantu*, internet and modern medical literature have been reviewed. **Result:** The *Tinospora cordifolia* plant had been appreciated to having high levels for medicinal, therapeutical, curative, healing and relieving nature. **Discussion:** *Guduchi* has high therapeutic potential by its anti-toxic, anti-inflammatory, anti-pyretic and anti-oxidant properties. There is also no evidence that *Guduchi* has any toxic content or side effects, which proves its safety aspect as well. **Conclusion:** The therapeutic and safety aspects studies reported in the present review confirm the medicinal properties of herb *Tinospora cordifolia* (*Giloy*) in preventing various diseases or abnormalities by increasing immunity naturally in human bodies.

Key words: *Amrita*, *Ayurveda*, *Therapeutic Potential*, *Tinospora cordifolia*.

INTRODUCTION

India is a country with well recorded and well-practiced herbal and traditional medicine. Natural products with medicinal value are gaining importance in clinical research today. Among the vast library of important

medicinal plants, *Guduchi* (*Tinospora cordifolia*) is immensely valuable in terms of therapeutics and global trade. *Tinospora cordifolia* commonly named as *Giloy*, *Guruch* and *Guruchi* in Sanskrit. It belongs to the family Menispermaceae. The plant is climbing shrub with greenish-yellow, heart-shaped leaf, found at higher altitude. *Giloy* is also known as *Amrita* which means 'Root of immortality' because of its various health benefits. The stems are rather succulent with long filiform fleshy aerial roots form the branches. The bark of the plant is gray brown and watery. The leaves have membranes and flowers are small and green in color. The height of this herb is maximum 300 meters. The flowers are active in last of summers till winters. The variety of active components which is derived from the herb is alkaloids, steroids, diterpenoid, lactones, aliphatics and glycosides and these can be isolated from various parts of the body like root, stem and

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whole plant. In mythological term *Guduchi* is referred as heavenly elixir having saved celestial beings from old age and kept them eternally young.^[1] *Bhavaprakasha* has mentioned *Guduchi* elaborately and has dedicated a *Varga* under the name *Guduchi* thereby emphasizing the importance of drugs, it is valued for its huge therapeutic potential since thousands of years and also in the modern scientific society it is appreciated for its immense clinical potential.

MYTHOLOGICAL REVIEW^[2]

It's narrated that, in a historical war between *Rama* and *Ravana*, several monkey warriors who supported *Rama* were killed. Pleased by the triumph of war and death of *Ravana*, Lord Indra sprinkled elixir on the dead bodies of the monkeys and provide rebirth. During the process, wherever the elixir drops have fallen on the earth, *Guduchi* plants originated.

Vedic kala - Sayan in Sounakiya Atharvaveda has mentioned that *Guduchi* is kept in every house to avoid snakes and scorpions. In *Kaushika Sutra*, *Guduchi* is mentioned by the name '*Kudruchi*'.

MATERIAL AND METHODS^[4]

Available references of the drug *Tinospora cordifolia* are traced from - *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Ashtanga Sangraha*, *Bhavprakash Nighantu*, *Raj Nighantu*, *Dhanvantari Nighantu*, *Shaligrama Nighantu*, *Priya Nighantu*, *Kaiydev Nighantu*, *Madanpal Nighantu*, *Shodhal Nighantu* etc.

Samhita Kaal

Charaka Samhita - There are several synonyms mentioned under *Guduchi* and it is included under seven different *Dashemani*. *Guduchi* is said to possess best *Sangrahika* and *Vibandha Prashamana* properties.

Sushruta Samhita - Description of *Guduchi* is found available at 41 places and is included in 9 *Ganas* or groups, based on it's diverse therapeutic uses. Apart from that it is also placed in smaller group like *Valli Panchamool*.

Ashtang Sangraha - *Guduchi* is mentioned alone or in combination with other remedial agents in the treatment of *Jwara*, *Prameha* etc.

Nighantu Kaal

Dhanvantari Nighantu - *Guduchi* was mentioned first in one out of seven *Vargas*. Two varieties - *Guduchi* and *Kanda Guduchi* are described.

Kaiyadev Nighantu - *Guduchi* is mentioned in *Aushadha Varga*. Varieties are mentioned as *Guduchi* as *Guduchi* and *Pinda Guduchi*.

Bhavaprakasha Nighantu - *Guduchi* has been mentioned under *Guduchyadi Varga* with its mythological origin with *Rasayana*, *Deepana* and *Balya* properties.

Raj Nighantu - Description of two types *Guduchi* and *Kanda Guduchi* with therapeutic utilities has been given.

Shaligram Nighantu - *Guduchi* has been described in *Guduchyadigana*.

Aadhunika Kaal

Dravyaguna Vigyana - The latin name vernacular names, synonyms, botanical description along with properties and action on different system are described with its therapeutic dose and formulation.

Indian Medicinal Plant - It's botanical description along with different species and medicinal uses are illustrated.

Materia Medica - Detailed description of *Guduchi* along with its use in scorpion bite, is documented.

Nirukti^{[2],[3]}

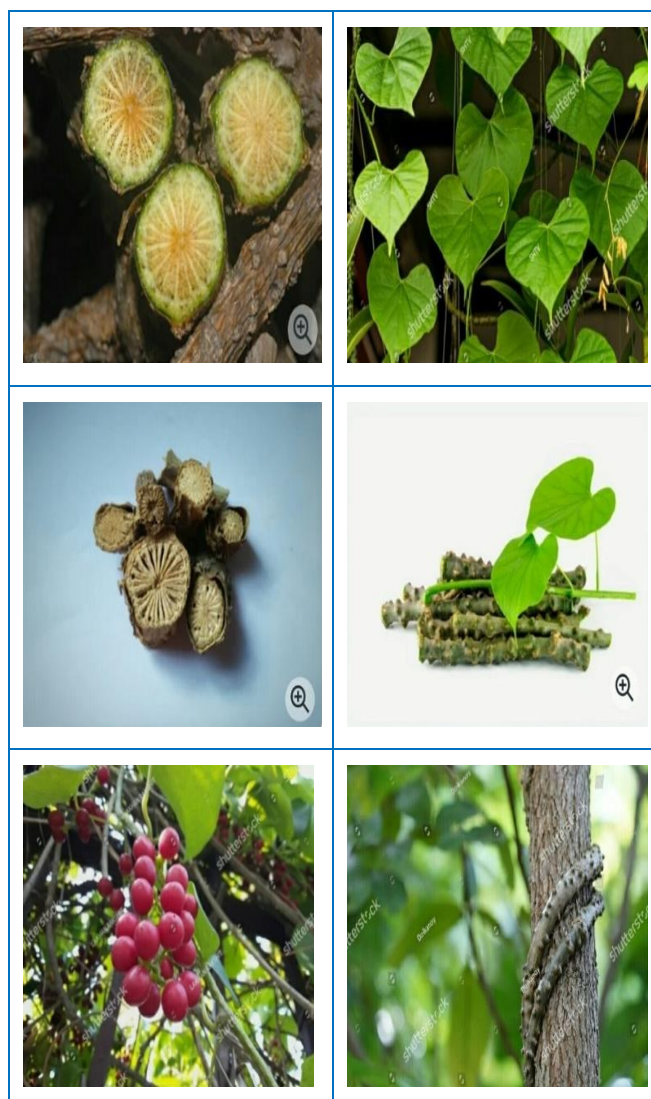
"*Gudatirakshati Rogebhyaiti*".

Guduchi protects from diseases.

Nirukti of Synonyms^{[2],[3]}

- *Amritvalli* - The creeper of the plant never dies.
- *Chhinnaruha* - When cut *Guduchi* grows again.
- *Amrit* - *Guduchi* is very useful plant and possess the qualities like that of nectar.
- *Kundali* - *Guduchi* ascends supporting plant in a circular way.
- *Kandodbhava* - *Guduchi* can be propagated with stem.

- *Chakralakshana* - When cut transversely the stem shows circular structure.
- *Jvaranashini* - Very efficacious drug fever.
- *Jivanti* - *Guduchi* protects the life because of its *Rasayana* property.
- *Madhuparni* - When crushed, leaves give viscid juice like that of honey.
- *Tantrika* - The stem of *Guduchi* resembles a rope.
- *Mandali* - *Guduchi* climbs up the supporting plant in a circular manner.
- *Vishalya* - *Guduchi* protect by removing toxins.
- *Chandrasaha* - The seeds are semilunar in shape.
- *Rasayani* - *Guduchi* has rejuvenating properties.



Gana / Varga

Table 1: Showing the classification according to various authors.

Classical Text	Gana / Varga
<i>Charaka Samhita</i>	<i>Triptighna, Stanyashodhana, Dahaprashamana, Snehopaga, Trishna-Nigrahana, Sandhaniya, Vayasthapana.</i>
<i>Sushruta Samhita</i>	<i>Guduchyadi, Patoladi, Aaragvadhadi, Kakolyadi, Vallipanchmool.</i>
<i>Ashtanga Hridaya</i>	<i>Shakavarga, Padmakadigana, Patoladigana, Guduchyadigana, Aaragvadhadigana, Shyamadigana.</i>
<i>Bhavprakash Nighantu, Dhanvantari Nighantu, Raj Nighantu, Shaligrama Nighantu, Nighantu Aadarsha, Shodal Nighantu</i>	<i>Guduchyadivarga</i>
<i>Madanapal Nighantu</i>	<i>Abhayadivarga</i>
<i>Kaiyadeva Nighantu</i>	<i>Aushadiyavarga</i>
<i>Priya Nighantu</i>	<i>Pippalyadivarga</i>

Botanical Classification^[4]

The plant is popularly known as *Guduchi*, is an herbaceous vine belonging to the menispermaceae and is found normally deciduous and dry forests. The botanical classification of this medicinal herb is given below:

- Kingdom - Plantae
- Subkingdom - Tracheobionta
- Division - Magnoliophyta
- Class - Magnoliopsida
- Clade - Angiosperms
- Order - Ranunculales

- Family - Menispermaceae
- Genus - *Tinospora*
- Species - *T. cordifolia*, *T. Malabarica*, *T. Crispa*

Bhedas/Varieties

Table 2: Showing the varieties of Guduchi according to various authors.

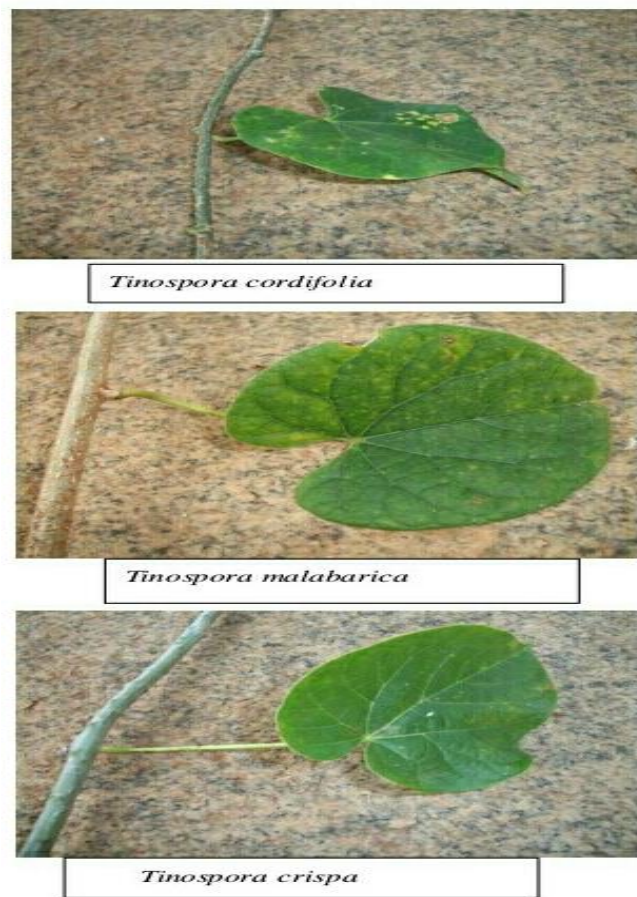
SN	Classical texts/Nighantu	No.	Bhedas
1.	Dhanvantari Nighantu	2	Padma Guduchi Kanda Guduchi
2.	Kaiyadeva Nighantu	2	Guduchi Pinda Guduchi
3.	Raj Nighantu	2	Guduchi Kanda Guduchi

Distribution

Tinospora cordifolia is the accepted botanical source for Guduchi. *T. Malabarica* and *T.Crispa* are used as substitutes and sometimes as adulterants also. Distribution of these three species varies across the country.

Table 3: The distribution of varieties of Guduchi are as described.

<i>T. cordifolia</i>	Globally the species is distributed in India, Sri Lanka, Bangladesh. Within India it is distributed in Arunachal Pradesh and in South India. In India, it is found throughout tropical India, ascending to an altitude of 900 m from Kumaon eastward as well as southwards up to Sri Lanka. It is often cultivated.
<i>T. Malabarica</i>	It's found in Bangal, Khasia, Assam, Orissa, Konkana, Kanara, Madras presidency and Ceylon.
<i>T. Crispa</i>	It's found in Assam and Arunachal Pradesh within India. And also in Barma, Malay peninsula and Ceylon.



Chemical Constituents^[5]

The different classes of compounds which are found in this plant are classed in groups like alkaloids, steroids, terpenoids, polysaccharides, glucosides and different aromatic and aliphatic compounds that are present in their phytoactive form that are responsible for the wide range of medicinal and therapeutic properties. The presence of these compound is found in various plant parts but highly concentrated in the stem, leaves and root part of the plant.

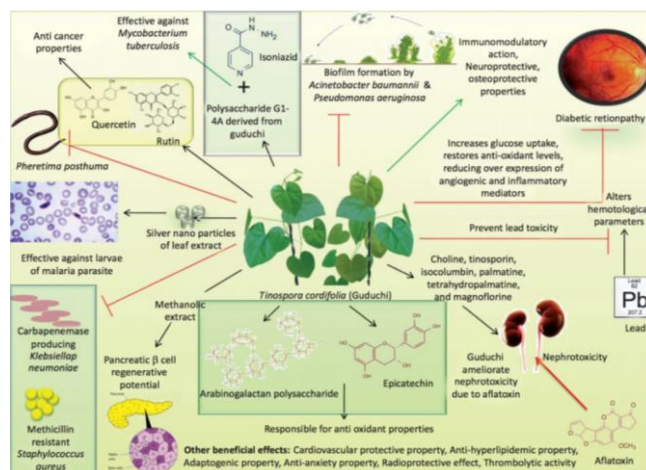


Table 4: Showing chemical constituents in three different varieties.

<i>T. cordifolia</i>	Diterpenoid of columbin type-tinosporin Tinosporide, Cordifolide Tinosporidine and β -Sistosterol, Cordifol, Heptasanol, Octasanol. Furanoid diterpene- tinosporide Five diterpene furan glycosider, cordifolisides A-E and two phenyl propane glycosides. Isocolumbin, tetrahydropalmatine, mangoflarine and palmatine.
<i>T. Malabarica</i>	β -Sistesterol, tetracosanoic acid and tinosporin Tinosporine and 5-allyloxy-6,7,4-trimethoxyflavone. Synthesis of 1,1-dibenoylthane Kokusaginine Malabarolide from stem is a new bisonorditerpenoid. Magnoflorine, quercetin -3-0-glucoside, kaemferol, 3-0 glucoside from menispermicide New phenolic glycoside-tinosinen.
<i>T. Crispa</i>	Apigenin, Diosmetin (Luteolin 4 methylether), Genkwanin, Luteolin 4-methylether 7-glucoside, Genkwanin 7-glucoside, Luteolin 4-methylether 3 glucoside. Cycloucalenol, Cycloeucaenone. Litcubinine, Salsolinol, Berberine, Palmatine. β -sistosterol stigmasterol, makisterone C Seciosolariciresinol, syringaresinol, Adenosine, Uridine, Adenine. Tinocrispol A Borapetol A, Borapetol B.

Rasapanchaka**Table 5: Showing Rasapanchaka of Guduchi.**

Classical texts	Rasa	Guna	Virya	Vipaka
Charaka Samhita	Tikta	Guru	Ushna	Madhura
Sushruta Samhita	Tikta	Guru	-	Guru
AshtangSangraha	Tikta	-	Ushna	-
AshtangHridaya	Tikta	-	Sheeta	Katu

<i>Dhanvantari Nighantu</i>	Tikta, Kashaya	Guru	Ushna	-
<i>Madanpal Nighantu</i>	Katu, Tikta, Kashaya	Laghu	Ushna	Madhura
<i>Kaiyadev Nighantu</i>	Tikta, Kashaya, Katu	Laghu	Ushna	Madhura
<i>Raj Nighantu</i>	Tikta, Kashaya	Guru	Ushna	-
<i>Bhavprakash Nighantu</i>	Katu, Tikta, Kashaya	Laghu	Ushna	Madhura
<i>Shaligram Nighantu</i>	Tikta, Kashaya	Guru, Ushna	Ushna	Madhura
<i>Dravyaguna Vigyanam</i>	Tikta, Kashaya	Guru, Snigdha	Ushna	Madhura

Karmas**Table 6: Showing Karmas of Guduchi.**

Karma	C S	S S	A S	D N	K N	R N	BP N	Sha. N
<i>Vatahara</i>	+	+	+	-	-	+	-	+
<i>Amahara</i>	-	-	-	-	-	-	-	+
<i>Sangrahani</i>	+	-	-	+	+	-	+	+
<i>Hridhya</i>	-	-	-	-	+	-	-	+
<i>Balya</i>	+	+	+	+	+	-	+	+
<i>Vahnrikita</i>	-	-	-	-	+	-	-	-
<i>Vatapittahara</i>	+	+	+	-	-	-	-	-
<i>Ayushya</i>	-	-	-	+	-	-	-	+
<i>Medhya</i>	-	-	-	+	-	-	-	-
<i>Medohara</i>	-	+	+	+	+	-	-	+
<i>Pittahara</i>	+	+	+	+	-	-	-	-
<i>Vataraktahara</i>	-	-	-	+	+	-	+	+

<i>Dipaneeya</i>	+	+	+	-	-	-	+	+
<i>Rasayani</i>	+	+	+	-	+	-	-	+
<i>Tridosahara</i>	-	+	+	+	-	-	+	+
<i>Vayasthapaniya</i>	+	-	-	-	-	-	-	-
<i>Raktadoshahara</i>	-	+	+	-	-	+	-	+

History and Vedic References

Uses in indigenous systems of medicine - The *Ayurvedic* drug *Guduchi* or *Amrita* is mentioned in various classical texts of *Ayurvedic* system of medicine, *Charaka*, *Sushruta* and *Ashtang Hridaya* and other treaties like *Bhavprakash* and *Dhanvantari Nighantu* under other various names, *Amara*, *Amritavalli*, *Chhinnaruha*, *Chhinnodbheda*, *Vatsadani* etc.^[44-46]

In *Sushruta Samhita*, it is mentioned under "*Tikta-Shakavarga*" and claimed to be useful in treating *Kushtha* (leprosy), *Mahajvara* (a kind of fever), *Shwasa* (asthma) and *Aruchi* (anorexia).^[47] In other treaties, *Charaka Samhita* and *Ashtang Hridaya*, it has been indicated in diseases like *Kamala* (jaundice), *Jvara* (fever) and *Vatarakta* (gout) etc.^[46-48]

In *Bhavprakash*, it is considered as a bitter tonic, astringent, diuretic and potent aphrodisiac and curative against skin infections, jaundice, diabetes and chronic diarrhoea and dysentery.^[49]

In *Dhanvantari Nighantu*, its medicinal properties are mentioned for cure of bleeding piles, promoting longevity, curing itching and erysipelas.^[50] It is reported to the potent vegetable tonic. Being a rejuvenator, it is indicated in several diseases causing debility. The fecula is nutritious especially in diarrhoea, largely given in cold fevers, seminal weakness, in urinary affections, jaundice, skin disease, various forms of diabetes and irritability of stomach.^[51] It is a traditional belief among the *Ayurvedic* practitioners that *Guduchi Satwa* obtained from *Guduchi* plant growing on *Neem tree* (*Azadirachta indica*) is more bitter and more efficacious and is said to incorporate the medicinal virtue of *Neem* also.^[44,51] The drug also caught the attention of

European physicians in India as a specific tonic, antiperiodic and for its diuretic properties and it was included in the Bengal pharmacopoeia of 1868.^[52]

T. cordifolia is mentioned in *Ayurvedic* literature as a constituents of several compound formulations used in general debility, dyspepsia, fever and urinary diseases.

Some of the important formulations are

Guduchyadi Churna, *Guduchi Tail*, *Dashmoolarishta*, *Sanjivanivati*, *Kantakari Avaleha*, *Chyavanprash*, *Kashaya Churna*, *Panchanimba Churna*, *Guduchi Ghrita*, *Amrita Guggul*, *Amritashtaka Churna* etc.^[45]

In Unani system, mostly "*Sat Giloy*" is incorporated in the preparations. "*Ara Giloy*" prepared from the fresh plant is considered a febrifuge, while "*Ara Maul-laham Mako-Kashiwala*" is a general tonic.^[53]

Rogagnata

Table 7: Showing Rogagnata of Guduchi according to various authors.

<i>Rogagnata</i>	C S	S S	A S	D N	K N	R N	BP N	Sh.N .
<i>Kamalahara</i>	-	-	-	+	-	-	+	+
<i>Pramehahara</i>	-	+	+	-	+	+	+	+
<i>Kandughna</i>	-	+	+	+	-	-	-	+
<i>Trishna-Nigrahana</i>	+	-	-	-	+	-	-	+
<i>Visarpaghna</i>	-	-	-	+	+	-	-	+
<i>Kasahara</i>	-	-	-	-	-	-	+	+
<i>Dahaprashamana</i>	+	+	-	-	-	+	+	+
<i>Kushthahara</i>	-	+	-	+	-	-	+	+
<i>Krimighna</i>	-	-	-	+	-	-	+	+
<i>Raktarshaghna</i>	-	-	-	+	-	-	-	+
<i>Bhramahara</i>	-	-	-	-	-	+	-	+
<i>Chardighna</i>	-	+	-	-	-	+	+	+

<i>Panduhara</i>	-	-	-	+	-	+	+	+
<i>Jwarahara</i>	+	+	-	+	-	+	+	+

Part Used^[5-6]

- Stem
- Leaf
- Root

Posology^{[1],[6],[7]}

- Kwatha - 50-100ml
- Churna - 1-3gm
- Satwa - 5-25ratti

Uses in folk and tribal medicine^[8]

T. cordifolia finds a special mention for its use in tribal or folk medicine in different parts of the country. Some of the important uses mentioned are given below:

Table 8: *T. cordifolia* (Guduchi) in folk and tribal medicine.

Tribals and areas	Diseases	Mode of Applications
The tribals of Bombay and its neighboring areas and the fishermen along the sea coast use <i>T. cordifolia</i> as drug in the treatment	fever, jaundice, chronic diarrhea and dysentery	The whole plant is used
The tribals of Khedbrahma region of North Gujrat use the plant in their day to day life as food or medicine.	They use powdered root and stem bark of <i>T. cordifolia</i> with milk for the treatment of cancer, decoction of root is used for the cure of dysentery and diarrhea and decoction of old stems is preferred in the treatment of periodic fever	Powdered root and stem bark, Decoction of root, Decoction of old stem.

Jammu and Bigwada (Rajasthan)	Fever	Decoction of stem
Bhuvneshwar (Orissa)	Fever	Warm juice of root of <i>T. cordifolia</i> orally
Patiyala (Punjab)	Fever	Juice and decoction of leaves orally with honey
The Muslim tribals of Rajouri, Jammu (Tawi) comprising Gujjars and Backwals	Fracture	Whole plant
In Dahanu forest division of Maharashtra, tribal races Agaris, Bhils, Dhodias, Dublas, Khakarais, Rimoshis, Thakurs, Vardaris, Vagharis and Varlis	As a Tonic in general debility	Stem decoction with cold or hot water (about 3-4 gm) in morning in an empty stomach.
Banka (Bihar)	<i>Baalshosha</i> (emaciation in children)	Shirt of child is dyed in juice of <i>Guduchi</i>
	<i>Daha</i> (burning sensation)	Paste of juice of <i>Amrita</i> (<i>T. cordifolia</i>) leaves and <i>Sarshapa Beej Churna</i> (seed powder of <i>Brassica campestris</i>) is applied locally
Dhurala (Haryana)	<i>Kasa</i> (Cough)	Powder of <i>Terminalia chebula</i> (<i>Haritaki</i>), <i>T. cordifolia</i> (<i>Amrita</i>) and <i>Trachyspermum ammi</i> (<i>Ajwain</i>) in equal quantity is administered orally, once daily early morning with

		salt. Decoction of these drugs is also to be taken in dose of 50 ml
Arjunpura (Rajasthan)	Raktapradar (lucorrhoea) by the local women	Paste of <i>Guduchi</i> (<i>T.cordifolia</i>) and 05 seeds of Krishna (<i>Maricha - Piper nigrum</i>) is administered orally once daily in morning
Badala (U.P.)	juice of stem orally with honey	<i>Shwasa</i> (Asthma)
Dehrabara Kolaras, Shivpuri District of M.P.	<i>Twakaroga</i> (Skin disease)	Decoction of stem is administered orally
Mundas of Chhota Nagpur	Fracture	Paste of whole plant used as plaster
In certain parts of India	Bites of poisonous insects and venomous snake, eye disorders	The paste of <i>Guduchi</i> is applied to the part bitten and administered internally through mouth at intervals of half an hour. Juice or decoction of the root is poured into the eyes.
Local people of Patiyala (Punjab)	<i>Karnashula</i>	2 drops of juice of leaves of allied species or <i>Guduchi</i> (<i>T. Sinensis</i>) are dropped in the affected ear.
Baiga, living in the interior areas of Naugarh and Chakia blocks of Varanasi district, Uttar Pradesh.	Fever	The pills are prepared from the paste of stem of the <i>Guduchi</i> (<i>T. cordifolia</i>) and the roots of <i>Bhatkatiaya</i>

		(<i>Solanum surettense</i>).
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Yogas of *Guduchi*^{[6],[7]}

Table 9: Showing some *Yogas of Guduchi*

SN	Yoga	Indication
1.	<i>Guduchi Satwa</i>	<i>Prameha, Rajayakshma</i>
2.	<i>Guduchi Taila</i>	<i>Vatarakta</i>
3.	<i>Amritarishta</i>	<i>Sarvajvara</i>

Substitutes and Adulterants^[6]

T. cordifolia is substituted or adulterated with other species of *Tinospora*, *T. Sinensis*, *T.Malabarica*, *T. Crispa*. Although, the microscopical characters of *T. Sinensis* resembles that of *T. cordifolia*, there are few characters by which these two species can be differentiated. The distinguishing characters are – In *T. cordifolia* the sclerenchymatous sheath becomes disintegrated into scattered irregular patches in the cortical regions whereas in *T. Sinensis* is broken into areas capping the vascular bundle and remains persistent even after further secondary growth. Crystals are absent in *T. cordifolia* while in *T. Sinensis* a large crystal of calcium oxalate is present within the lumen of each cork cell. Mucilaginous cells are more in *T. cordifolia* as compared to *T. Sinensis* vascular strands or fewer in *T. cordifolia* while greater in *T. Sinensis*. Xylem is well developed in each strip of vascular strand in *T. cordifolia* while it is poorly developed in *T. Sinensis*. Pith is very narrow and composed of thin walled cells in *T. cordifolia* while it is wide in *T. Sinensis*. Starch content is more in *T. cordifolia* as compared to *T. Sinensis*.

Standards for Identity and Purity^[7] (Quantitative Standards)

The following standards for identity and purity are reported.^[13-14]

- Foreign matter - Not more than 2.0%
- Total ash - Not more than 7.0%
- Acid soluble ash - Not less than 0.8%

- Ethanol soluble extractive - Not less than 6.0%
- Loss of drying - Not more than 7.5%
- Lead - Not more than 10 ppm
- Arsenic - Not more than 2 ppm
- Heavy metals - Not more than 20 ppm
- Total bacterial count - Not more than 3000 CFU/gm
- Yeasts and Moulds - Not more than 100 CFU/gm
- Bitters content on dry basis by Gravimetry / HPTLC - Not less than 3% w/w.

Therapeutic Applications^[9-21]

Table 10: Karma (action - pharmacodynamics) and Prayoga (uses) of *T. cordifolia*.

Karma	Prayoga	Classical references
Rasayana, Sangrahi, Balya, Agnidipana, Tridoshashamaka	Daha, Meha, Kasa, Pandu, Kamla, Kushtha, Vatarakta, Jwara, Krimi, Prameha, Shwasa, Arsha, Mutrakrichha and Hridroga	Bhavprakash Nighantu, ^[9] Guduchyadi Varga, 8-10
Vata-Pitta-Kaphanashaka, Trishnanashaka, Agnideepaka	Jwara, Chhardi, Daha	Ashtang Sangraha Sutrasthan ^[10] 7-149,16-10
Sangrahi, Vatahara, Agnideepana, Shleshma-Shonitaprashamana	Vibandha	Charak Samhita Sutrasthan ^[11] 25-40
Tridosh-nashaka, Vishaghni, Jwara-bhootaghni.	Jwara, Daha, Trishna, Vatarakta, Prameha, Pandu, Bhrama, Valipalitya.	Raj Nighantu ^[12] Guduchyadi Varga 17-18.
Deepana, Grahi	Kasa, Pandu, Jwara	Arka Prakash ^[13] Tritiya Shatak
Balya, Tridoshanashaka	Laghujwara, Meha, Daha, Kasa, Pandu, Vitsarana Atisara)	Siddha Bhaishajya Mani

		Mala ^[14] Dwitiya guchh 70
Tridoshghni, Grahi, Rasayana, Dipana	Jwara, Daha, Kamala, Vatarakta	Shodhal Nighantu ^[15] Guna Sangraha, Guduchyadi Varga-120
Sangrahi, Balya, Agnideepana	Kamala, Kushtha, Vatarakta, Jwara, Pitta, Vibandha. Krimi	Madan Pal Nighantu ^[16] Haritakyadivarga 39,40,41
Sangrahi, Vrishya, Balya, Rasayana, Dipana, Chakshushya, Vayahsthapana, Medhya, Tridoshanashaka,	Kushtha, Krimi, Chhardi, Daha, Vatarakta, Pandu, Jwara, Kamala, Meha, Trishna, Kasa	Kaidev Nighantu ^[16] Aushadhi Varga 09,10, 11
Tridoshanashaka, Aayushyaprada, Medhya, Sangrahi	Jantu, Raktarsha, Raktavata, Kandu, Visarpa, Kushtha, Visha, Bhoota, Vali-Palitya, Chhardi, Meha, Jwara.	Dhanvantari Nighantu ^[17] Guduchyadi-05,06,07,08
Grahi, Balya, Rasayana, Deepana, Hridhya, Aayushyaprada, Chakshushya, Tridoshaghna	Jwara, Chhardi, Kamla, Daha, Trisha, Bhrama, Pandu, Prameha, Kasa, Kushtha, Krimi, Vatarakta, Kandu, Meda, Visarpa, Aruchi, Hikka, Arsha, Mutrakrichha, Pradara, Somaroga	Shaligram Nighantu ^[18] Guduchyadi Varga 251,252,253
Pitta-Kaphahara	Vataja Granthi, Vataja Galganda	Sushruta Samhita Sutrasthan 46:270, ^[19-20] Chikitsa 18:05,46 ^[21]

- **Effects on Stress, Learning and Memory** - *T. cordifolia* is known as *Medhya Rasayana* (learning and memory enhancer - *Mandukparni, Shankhapushpi, Guduchi, Yashtimadhu*) in *Ayurveda*. It is also described to be useful for

treatment of *Bhrama* (vertigo) in various Ayurvedic texts. Significant response has been found in children with moderate degree of behavior disorders and mental deficit, along with improvement in IQ levels.^[22] The root of *T. cordifolia* is known to be used traditionally for its antistress activity in rheumatoid arthritis.^[23]

- **Anti-allergic activity** - *T. cordifolia* is used for the treatment of *Kasa* (cough) and *Shwasa* (asthma) which is described in various texts of Ayurveda (Table 10). *T. cordifolia* is traditionally used for the treatment of asthma, and the juice is also employed for the treatment of chronic coughs.
- **Anti-oxidant activity** - *T. cordifolia* is mentioned as *Vishaghni*, *Vishahara* and *Tridoshashamaka* in various texts of Ayurveda. (Table 10)
- **Anti-Neoplastic and Radioactive activity** - *T. cordifolia* induces proliferation and myeloid differentiation of bone marrow precursor cells in a tumor-bearing host. Activates tumor-associated macrophages - derived dendritic cells.^[24] It is effective against various cancers^[25] Killing the cancer cells very effectively.^[26-27] Inhibits skin carcinogenesis.
- **Anti-Pyretic and Anti- Infective activity** - Traditionally *T. cordifolia* is known for its *Jwarahara* activity (antipyretic activity) (Table 10)
- **Hepato-protective activity** - Various Ayurvedic preparations of *T. cordifolia* are indicated in *Pandu* (anemia) and *Kamala* (Jaundice). *Guduchi* plays an important role in normalization of altered liver functions (ALT, AST).^[28]
- **Anti-Hyperglycemic activity** - *T. cordifolia* is widely used in Ayurveda for treating diabetes mellitus.^[29-31] *Giloy* is known as '*Madhunashini*' which means 'destroyer of sugar'. It helps to enhance the production of insulin which ultimately controls the blood sugar levels. Various studies demonstrate amelioration of experimental diabetic neuropathy and gastropathy.^[32] Reduction of blood sugar in alloxan induced hyperglycemic.^[33] Significant reduction in blood glucose and brain lipids.^[34] *Giloy*

is also useful for diabetes complications like ulcers, kidney problems.

- **Immunomodulatory activity** - In Ayurveda *T. cordifolia* is believed to have *Rasayana* (rejuvenating) *Balya*, *Vayahsthapan* (anti-aging), *Ayushyaprada* (increases the life span), *Vrishya* (aphrodisiac) and *Chakshushya* (useful in eye disorders) properties. (Table 10)
- **Anti-Angiogenic activity** - The plant *T. cordifolia* is related to the regulation of the levels of cytokines and growth factors in the blood.^[35]
- Diabetic patients with foot ulcers on *T. cordifolia* as an adjuvant therapy showed significantly better final outcome with improvement in wound healing.^[36]
- **Diuretic activity** - *T. cordifolia* has been described as useful in *Mutrakrichha* (urinary trouble) separately and in the form of various formulations in Ayurveda. (Table 10)
- **Cardio-protective activity** - *Bhavprakash* and *Shaligram Nighantu* describe the *T. cordifolia* to have *Hrudhya* (cardioprotective) properties and is useful *Hridroga* (cardiac disorders) (Table10)
- **Anti-Leptotic activity** - *T. cordifolia* is used for its *Kushthahara* (antileptotic properties, along with wide use in *Kandu* and *Visarpa* (types of skin disorders).^[37]
- **Gastrointestinal and Antiulcer activity** - Ayurvedic properties of *T. cordifolia* include *Sangrahani*, *Arshahara*, *Aruchinashaka*, *Deepana*, *Chhardihara*, *Trishnahara* and *Hikkahara* treatment with a formulation containing *T. cordifolia* has been shown to reduce ulcer index total acidity.^[38]
- **Anti-Fertility activity** - It decreased the weight of testes, epididymis, seminal vesicle and ventral prostate in a significant manner.^[39]
- **Osteoprotective activity** - *T. cordifolia* showed an osteoprotective effect, as the bone loss in tibia was slower than that in controls. Extracts of *T. cordifolia* has the potential for being used as antiosteoporotic agent.^[40-41]

- **Giloy for Corona virus infection** - *Giloy* can boost immunity hence it may be useful for various fevers specially for viral fevers like corona infection. Though there is no evidence that *Giloy* can cure corona infection but it can raise our immunity to fight against it. We can take *Giloykadha* or *Giloy* juice two times per day for 4-6 weeks.

Toxicology^[4]

No significant information on side effects is available so far. Nothing conspicuous has been done as yet in this aspect, although many experiments have already been conducted on this plant. According to Ayurveda, herbs are taken in combination with other herbs with the opposing effect of the other or to enhance the particular effect of one herb with the help of the other.

Safety aspects

The drug is traditionally considered to be safe in the dosage mentioned.^[51] Ministry of AYUSH has recently noticed safety concerns on use of *Guduchi* (*Tinospora cordifolia*) that were published in social media and in some scientific journals. This advisory is being issued to confirm that *Guduchi* (*Tinospora cordifolia*) is safe to use and only *Tinospora cordifolia* should be used in therapeutics but some similar looking species like *Tinospora crispa* may be harmful (may manifest adverse effects).

RESULT

Amrita has strong Immunity booster, Antipyretic, Anti-infective, Antidiabetic, Rejuvenative, Aphrodisiac, Anti-inflammatory, Antihyperglycemic, Cardioprotective, Antileprotic, Osteoprotective, Hepatoprotective, Anti-ulcerative, Diuretic, Anti-Neoplastic, Radioactive and many other properties. *Rasayana* is the means of attaining excellent qualities of *Rasaadi Dhatus*, body cells and tissues and all the properties of *Rasayana* is present in *Guduchi* which is one of the most potential drugs of Ayurveda.

DISCUSSION

The term *Rasayana* refers to nourishment or nutrition. *Rasayana* drugs act essentially on nutrition dynamics and rejuvenate the body and psyche. *Rasayana* drugs

also promotes intellect and strength, prolongation of life and helps in the prevention of diseases. *Amrita* is one among the four drugs of *Medhya Rasayana* which has anxiolytic and tranquilizing effect, which helps to maintain the mental health of human being. When it consumed regularly is life promoting, disease alleviating, promoter of strength, Agni, complexion, voice and intellect promoting. On regular consumption with proper quantity one attains longevity, memory, intelligence, freedom from illness, youthfulness, excellence of luster, optimum strength of physique and sense organs, perfection in deliberation, respectability and brilliance. Clinical evaluation of a non-hormonal drug Minofil containing *T. cordifolia* along with other plant drugs was done in women of postmenopausal syndrome.

The therapeutic and safety aspects studies reported in the present review confirm the medicinal properties of herb *Tinospora cordifolia* (*Giloy*) in preventing various diseases or abnormalities by increasing immunity naturally in human bodies.

CONCLUSION

Ayurvedic preparations contained *Guduchi* are used for the treatment of various ailments throughout the centuries. It is used as a *Rasayana* to improve the immune system and body resistance against infections. The therapeutic efficacy of *T. cordifolia* extensively used in Indian system of Medicine (ISM) has been established through modern testing and evaluation (pre-clinical and clinical trials) in different disease conditions. More study is needed about *Tinospora cordifolia* to explore further, about its potential in preventing and treating various diseases. This classical medicine is the ultimate answer to all health anomalies.

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