

**Review Article****Review on  
*Tinospora cordifolia*****Ms Aaliya Rafiq Pathan**R.H.no.6/12, Swami Samarth Hsg.Soc.  
Chakan Tal: Khed, Pune, Maharashtra, IndiaDate Received: 20<sup>th</sup> July 2017; Date accepted:  
29<sup>th</sup> July 2017; Date Published: 8<sup>th</sup> August 2017**Abstract**

Traditional systems of medicine such as Ayurvedic, Unani, Siddha and Homeopathy (AYUSH) have been in practice in a great account. Owing to population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments as witnessed by the use of folk medicines in the present scenario.

This review article describes the prominence of a medicinal plant *Tinospora cordifolia* in therapeutics such as use of crude extract of plant for the amelioration of various diseases, morphology, growth constraints, biochemical composition, biological activities, research work, projects sanctioned to this plant species and the future prospects of this important neglected plant species for research in the field of plant tissue culture, natural products and biotechnology.

**Keywords** – *Tinospora cordifolia*, phytoconstituents, biological activity, methanol

**Introduction**

Plants and plant products have always had meaning in many parts of human life. The use of plants as medicines predates written human history. Knowledge of plant use was widespread in ancient civilization. Until the middle of the 19<sup>th</sup> century, plants were the main therapeutic agents used by

humans and even today their role in medicine is still relevant. One can argue forever, what precise percentage of the world's population use local and traditional medicine. These herbal, mineral, fungal, occasionally animal medical products from systems of knowledge and practice have been transmitted over centuries and which continually change<sup>1</sup>. In developing countries and rural societies, the use of medicinal plants is both a valuable resource and necessity and furthermore, it provides a real alternative for primary health care systems<sup>2</sup>.

*Tinospora cordifolia* is one of the noncontroversial and extensively used herbs in Ayurvedic medicine. It belongs to family Menispermaceae. It is a glabrous, succulent, woody climbing shrub native to India. It is also found in Burma and Sri Lanka. It thrives well in the tropical region, often attains a great height, and climbs up the trunks of large trees. The stem is gray creamy white, deeply cleft spirally and longitudinally, with the space between spotted with large rosette-like lenticels. The wood is white, soft, and porous, and the freshly cut surface quickly assumes a yellow tint when exposed to air. Leaves are simple, alternate, exstipulate, long petiolate, chordate in shape showing multi-coated reticulate venation. Long threadlike aerial roots come up from the branches. Flowers are small and Unisexual. Male flowers are in clusters female flower are solitary. Six sepals arranged in two whorls of three each. Six petals arranged in two whorls, they are obovate and membranous. Aggregate fruit is red, fleshy, with many drupelets on thick stalk with sub terminal style scars, scarlet coloured<sup>3</sup>. *Tinospora cordifolia* is known by different name in various different languages in India viz, Tippa-teega (Telugu), Shindilakodi (Tamil), Amruthu, Chittamruthu (Malayalam), Amruthaballi (Kannada), Rasakinda (Sinhala), gurcha (Hindi), garo (Gujarati), Amritavalli (Sanskrit), Guduchi (Marathi), Guluchi (Oriya)<sup>4</sup>.

**Material and methods**

The plant material was collected from local area of Hadapsar, Pune (Maharashtra) India. The plant was authenticated from Botanical Survey of India, Koregaon park, Pune. The plant was authenticated as *Tinospora cordifolia* (Miers.).

## Biological Activities

The major biological activities of *Tinospora cordifolia* are summarized.

Active Component	Compound	Plant Part	Biological Activity (In Human being)
<b>Alkaloids</b>	Berberine, Choline, Tembetarine, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine,	Stem, Root	Anti-viral infections, Anticancer, anti-diabetes, inflammation, Neurological, immunomodulatory, psychiatric conditions <sup>5-12</sup>
<b>Diterpenoid Lactones</b>	Furanolactone, Clerodane derivatives [(5R,10R)-4R-8R-dihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S:18,1S-dilactone], Tinosporon, Tinosporides, Jateorine, Columbin	Whole Plant	Vasorelaxant: relaxes norepinephrine induced contractions, inhibits Ca <sup>++</sup> influx, anti-inflammatory, anti-microbial, antihypertensive, anti-viral. Induce apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2. <sup>13-17</sup>
<b>Glycosides</b>	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside Syringin, Syringinapiosylglycoside, Pregnane glycoside, Palmatosides, Cordifolioside A, B, C, D and E	Stem	Treats neurological disorders like ALS, Parkinsons, Dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, Immunomodulation, Inhibits NF-κB and act as nitric oxide scavenger to show anticancer activities <sup>18-24</sup>
<b>Steroids</b>	β-sitosterol, δ-sitosterol, 20 β-hydroxyecdysone, Ecdysterone, Makisterone A, Giloinsterol	Shoot	IgA neuropathy, glucocorticoid induced osteoporosis in early inflammatory arthritis, induce cell cycle arrest in G2/M phase and apoptosis through c-Myc suppression. Inhibits TNF-α, IL-1 β, IL-6 and COX-2. <sup>25-27</sup>
<b>Sesquiterpenoid</b>	Tinocordifolin	Stem	Antiseptic <sup>28</sup>
<b>Aliphatic compound</b>	Octacosanol, Heptacosanol Nonacosan-15-one dichloromethane	Whole plant	Anti-nociceptive and anti-inflammatory. Protection against 6-Hydroxyl dopamine induced parkinsonisms in rats. Down regulate VEGF and inhibits TNF-α from binding to the DNA. <sup>29-31</sup>

Others	3,(a,4-di hydroxy-3-methoxy-benzyl)-4-(4-compounds hydroxy-3-methoxy-benzyl)-tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifellone, Giloinin, Giloin, N-transferuloyl tyramine as diacetate, Tinosporic acid.	Root, Whole Plant	Protease inhibitors for HIV and drug resistant HIV. <sup>32-33</sup>
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## CONCLUSION

*Tinospora cordifolia*, the versatile medicinal plant is the unique source of various types of compounds having diverse chemical structure. Very little work has been done on the biological activity and plausible medicinal applications of these compounds and hence extensive investigation is needed to exploit their therapeutic utility to combat diseases. A drug development program should be undertaken to develop modern drugs with the compounds isolated from *Tinospora cordifolia*. Present review spotlights the classical ant diabetic, anticancer, immunomodulatory, antioxidant, antimicrobial, antitoxic claims of *Tinospora cordifolia* and their validation by contemporary researches. For the last few years, there has been an increasing trend and awareness in medicinal plants research. Quite a significant amount of research has already been carried out during the past few decades in exploring the chemistry of different parts of *Tinospora cordifolia*. While *Tinospora cordifolia* has been used successfully in Ayurvedic medicine for centuries, an extensive research and development work should be undertaken on *Tinospora cordifolia* and its products for their better economic and therapeutic utilization. This review can be used for further research as well as clinical purpose.

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