Review Article

Review on

*Tinospora cordifolia*

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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 19th 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 change1. 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 systems2.

*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, chordeate 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 coloured3. *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).

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.

<table>
<thead>
<tr>
<th>Active Component</th>
<th>Compound</th>
<th>Plant Part</th>
<th>Biological Activity (In Human being)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alkaloids</strong></td>
<td>Berberine, Choline, Tembetaryne, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine, Jatrorrhizine</td>
<td>Stem, Root</td>
<td>Anti-viral infections, Anticancer, anti-diabetes, inflammation, Neurological, immunomodulatory, psychiatric conditions</td>
</tr>
<tr>
<td><strong>Diterpenoid Lactones</strong></td>
<td>Furanolactone, Clerodane derivatives [(5R,10R)-4R-8Rdihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S:18,1Sdilactone], Tinosporon, Tinosporides, Jateorine, Columbin</td>
<td>Whole Plant</td>
<td>Vasorelaxant: relaxes norepinephrine induced contractions, inhibits Ca++ influx, anti-inflammatory, anti-microbial, antihypertensive, anti-viral. Induce apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2, 13-17</td>
</tr>
<tr>
<td><strong>Glycosides</strong></td>
<td>18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordioside, Tinocordifolioside, Cordioside, Cordifolioside Syringin, Syringinapiosylglycoside, Pregnan glycoside, Palmatosides, Cordifolioside A, B, C, D and E</td>
<td>Stem</td>
<td>Treats neurological disorders like ALS, Parkinsons, Dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, Immunomodulation, Inhibits NF-kB and act as nitric oxide scavenger to show anticancer activities18-24</td>
</tr>
<tr>
<td><strong>Steroids</strong></td>
<td>β-sitosterol, δ-sitosterol, 20 β-hydroxyecdysone, Ecdysterone, Makisterone A, Giloinsterol</td>
<td>Shoot</td>
<td>IgA neuropathy, glucocorticoid induced osteoporosis in early inflammatory arthrits, 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 25-27</td>
</tr>
<tr>
<td><strong>Sesquiterpenoid</strong></td>
<td>Tinocordifolin</td>
<td>Stem</td>
<td>Antiseptic28</td>
</tr>
<tr>
<td><strong>Aliphatic compound</strong></td>
<td>Octacosanol, Heptacosanol Nonacosan-15-one dichloromethane</td>
<td>Whole plant</td>
<td>Anti-nociceptive and anti-inflammatory. Protection against 6-Hydroxyl dopamine induced parkinsonisms in rats. Down regulate VEGF and inhibits TFN-α from binding to the DNA.29-31</td>
</tr>
</tbody>
</table>
Others

3,(a,4-di hydroxy-3-methoxy-benzyl)-4-(4-compounds hydroxy-3-methoxy-benzyl)-tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifelone, Giloin, Giloin, N-transferuloyl tyramine as diacetate, Tinosporic acid.

Root, Whole Plant

Protease inhibitors for HIV and drug resistant HIV,32-33

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.

References


