TINOSPORA CORDIFOLIA- A MIRACLE HERB AND LIFELINE TO MANY DISEASE

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Abstract

Tinospora cordifolia is a widely used in folklore and Ayurvedic systems of medicine, belongs to the family menispermaceae. Even today in the world of modern medicines, Tinospora cordifolia is called ‘a magical herb’ due to its property of curing a lot of maladies. It has been been used for treatment of diabetes, jaundice, chronic diarrhea, cancer, dermatological diseases, general debility, asthma, edema, gout, swine flu (H1N1), hepatitis, hyper acidity, dyspepsia, fever, urinary and skin diseases. Potential of this herb in management of deadly diseases like HIV and cancer makes it a plant of clinical interest. Further, it is a rich source of biologically active compounds, which would attract the attention of drug discovery groups to discover novel bioactive molecules for safer and effective treatment of various diseases. This review article describes the prominence of a medicinal plant Tinospora cordifolia in therapeutics uses in various diseases, morphology, biochemical composition and biological activities.

Keywords: Tinospora cordifolia, alkaloids, Berberine.

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INTRODUCTION

Medicinal plants consist of components of therapeutic values and have been used as remedies for human diseases since long. Recently, due to the pathogens resistance against the available antibiotics and the recognition of traditional medicine as an alternative form of health care has reopened the research domain for the biological activities of medicinal plants (Ariaset al., 2004). The increasing demand of plant extracts to be use in the cosmetic, food and pharmaceutical industries suggests that systematic studies of medicinal plants are very important in order to find active compounds and their use as a medicine for curing various diseases (Nostroet al., 2001)

_Tinospora cordifolia_ (Family Menispermaceae) is known to produce diverse classes of pharmacologically active compounds. In traditional medicine, it has been used in treatment of jaundice, rheumatism, urinary disorder, skin diseases, diabetes, anemia, inflammation, and allergic condition. The pharmacological activity of _T. cordifolia_ is related to several classes of secondary metabolites like alkaloids, glycosides, diterpenoid lactones, steroids, sesquiterpenoids, and aliphatic compounds specifically Cordifolioside A .(Mittaletal., 2014; Molla etal., 2012; Alam, 2009; Singhetal., 2003)

**Classification**

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Ranunculales

Family: Menispermaceae

Genus: Tinospora

Species: _T. cordifolia_

Common names: (Sharma et al., 2010)

Latin: _Tinospora cordifolia_ (willd.) Hook.F. & Thomson

English: Gulancha/ Indian tinospora

Sanskrit: Guduchi, Madhuparni, Amrita, Chinnaruha, Vatsadaani, Tantrika, Kundalini & Chakralakshanika.

Hindi: Giloya, Guduchi

Bengali: Gulancha

Telugu: Tippatiga

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Tamil: Shindilakodi
Marathi: Shindilakodi
Gujarathi: Galo
Kannada: Amrita balli

Distribution
The plant is distributed throughout the tropical region of India up to 1,200 m above sea level from Kumaon to Assam, in north extending through West Bengal, Bihar, Deccan, Konkan, Karnataka and Kerala. It is a fairly common plant of deciduous and dry forests, growing over hedges and small trees.

Botanical description
It is a large, deciduous extensively spreading climbing shrub with several elongated twining branches. Leaves simple, alternate, extipulate, long petioles up to 15cm long, roundish, pulvinate, both at the base and apex with the basal one longer and twisted partially and half way around. Lamina broadly ovate or ovate cordate, 10-20 cm long or 8-15 cm broad, 7 nerved and deeply cordate at base, membranous, pubescent above, whitish tomentose with a prominent reticulum beneath. Flowers unisexual, small on separate plants and appearing when plant is leafless, greenish yellow on axillary and terminal racemes. Male flowers clustered, female usually solitary. Sepals 6, free in two series of three each, the outer ones are smaller than the inner. Petals 6 free smaller than sepals, obovate and membranous. Fruits aggregate of 1-3, ovoid smooth drupelets on thick stalk with sub terminal style scars, scarlet or orange coloured.

Fig 1: Morphology of different parts of T. cordifolia A. Leaf, B. Fruit, C. Stem

Cultivation: Manures, fertilizers and pesticides: The medicinal plants have to be grown without chemical fertilizers and use of pesticides. Organic manures like, Farm Yard Manure (FYM),
Vermi-Compost, Green Manure etc. may be used as per requirement of the species. To prevent diseases, bio-pesticides may be used.

**Irrigation:** The field after plantation should be irrigated periodically as and when required at weekly or fortnightly intervals. Harvesting/post-harvesting operation: Mature plants are collected, cut into small pieces and dried in shade.

**Cultivation method:** The plant is sometimes cultivated for ornamental value and is propagated by cuttings. It is so easy to propagate that even if a twig of it is placed on a branch of a tree, it will establish itself as a giant chamber in a couple of years.

<table>
<thead>
<tr>
<th>PHYTO CONSTITUENT</th>
<th>BIOLOGICAL ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berberine</td>
<td>Antimicrobial (Cernakova M et al., 2002); Antiproliferative (Tungpradit R et al., 2011); Antiplasmodial, Antiamoebic (Wright CW et al., 2000); Antifungal (Vollekova A et al., 2003); Antiphotooxidative (Kim JP et al., 2000)</td>
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<tr>
<td>Columbin</td>
<td>Schizonticidal (Patel JP et al., 2010)</td>
</tr>
<tr>
<td>Cordifolioside A</td>
<td>Immunomodulatory (Kapil A et al., 1997; Sudhakaran DS et al., 2006)</td>
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<tr>
<td>Cordioside</td>
<td>Immunomodulatory (Sudhakaran DS et al., 2006); Schizonticidal (Patel JP et al., 2010)</td>
</tr>
<tr>
<td>ECD</td>
<td>Anticancer (Muniyappan D et al., 2009)</td>
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<tr>
<td>Ecdysterone</td>
<td>Anabolic (Syrov VN et al., 1976); Immunomodulatory (Chiang HC et al., 1979)</td>
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<tr>
<td>Isocolumbin</td>
<td>Antiinflammatory (Moody JO et al., 2005); Antimicrobial (Yuan SHI et al., 2010); Antimalarial (Roja G et al., 2005)</td>
</tr>
<tr>
<td>Jatorrhizin</td>
<td>Antimicrobial (Yuan SHI et al., 2010); Antimalarial (Roja G et al., 2005)</td>
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<tr>
<td>Magnoflorine</td>
<td>Cytotoxic (Kokorus ZRD et al., 2006); Antioxidant (Hung TM et al., 2007)</td>
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<tr>
<td>Palmatine</td>
<td>Antiplasmodial, Antiamoebic, Cytotoxic (Wright CW et al., 2000); Antifungal (Vollekova A et al., 2003); Antiphotooxidative (Kim JP et al., 2000); Antimicrobial (Yuan SHI et al., 2010)</td>
</tr>
<tr>
<td>Syringin</td>
<td>Immunomodulatory (Kapil A et al., 1997); Hypotensive (Ahmad M et al., 1995); Antiinflammatory (Choi J et al., 2004)</td>
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<tr>
<td>Tembetarine</td>
<td>Antinociceptive (Nishiyama Y et al., 2010)</td>
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<tr>
<td>Tinosporide</td>
<td>Schizonticidal (Patel JP et al., 2010)</td>
</tr>
<tr>
<td>Tinocordifolioside</td>
<td>Schizonticidal (Patel JP et al., 2010); Antihyperlipidemic (Thahera DP et al., 2011)</td>
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</table>
Table 2: Phytochemical Profile of T.cordifolia

<table>
<thead>
<tr>
<th>Chemical class</th>
<th>Phyto constituents</th>
<th>Plant part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>Berberine, Temberterine, Choline, Tinosporin, isocolumbin, tetrahydropalmitine, jatrorrhizine</td>
<td>Stem, Root</td>
</tr>
<tr>
<td>(Meshram et al., 2013; Singh SS et al., 2003; Sinha K et al., 2004)</td>
<td>Palmitine</td>
<td>Stem and root</td>
</tr>
<tr>
<td>Diterpenoid lactones</td>
<td>Clerodane derivatives, tinosporon, tinosporides, jaiterine, columnin</td>
<td>Whole plant</td>
</tr>
<tr>
<td>(Singh SS et al., 2003; Maurya R et al., 1997; Maurya R et al., 1989; Swaminathan K et al., 1989)</td>
<td>18-norclerodane glucoside, furanoid diterpene glucoside, cordiofolioside A, cordiofolioside B, palmatosides C, palmatosides P1, cordiofolioside C, cordiofolioside D, cordiofolioside E</td>
<td>Stem</td>
</tr>
<tr>
<td>Glycosides</td>
<td>Tinosporidine, cordifol, cordifolone, N-trans-feruloyl tyramine as diacetate, giloin, gilonin, tinosporic acid</td>
<td>Root</td>
</tr>
<tr>
<td>(Singh SS et al., 2003; Gagan VD et al., 1994; Wazir V et al., 1995; Gagan VD et al., 1996; Maurya R et al., 1997; Ghosal S et al., 1997)</td>
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<tr>
<td>Miscellaneous compounds</td>
<td>Tinocordifolin</td>
<td>Stem</td>
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<tr>
<td>(Singh SS et al., 2003; Hanuman JB et al., 1986)</td>
<td></td>
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<tr>
<td>Sesquiterpenoids</td>
<td>Octacosanol, heptacosanol, nonacosan-15-one</td>
<td>Whole plant</td>
</tr>
<tr>
<td>(Maurya R et al., 1998)</td>
<td></td>
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<tr>
<td>Aliphatic compounds</td>
<td>20-hydroxy ec dysone, ec dysosterone, makisterone A, giloinsterone</td>
<td>Aerial parts, Stem</td>
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<tr>
<td>(Singh SS et al., 2003)</td>
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</table>
CONCLUSION

A plants with as diverse a role as Tinospora cordifolia is a versatile resource for all forms of life. There are reports as already discussed that the plant extracts have active compounds in the form of alkaloids, glycosides, lactones and steroids. All these active compounds have immunomodulatory and physiological roles of different types, thereby demonstrating the diverse versatility of the plant. The future scope of the review remains in exploiting the biochemical and signaling pathways of the active components of Tinospora thus, enabling effective disease targeting.

REFERENCES


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