THERAPEUTIC REVIEW ON MEDICINAL PLANT MERREMIA DISSECTA

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ABSTRACT

Merremia dissecta (Jacq.) Hallier f. (Convolvulaceae) is a perennial herb, weed and climber native to the United States and distributed across the globe. The plant is cultivated and having importance as “folk medicine”. Beside its remedial properties, it is often used as a condiment and ornamental. The plant is fortified with various bioactive constituents, specially leaves consist of glycosides, alkaloids, tannins, saponins, phenols and flavonoids. The presence of cyanogenic glycoside is characteristic feature of Merremia dissecta. Thus, the phytoconstituents are reflecting pharmacological properties and reported as antimicrobial, antifungal and antipathogenic. Leaf extract is effective against snakebite venom. The goal of this review is to highlight the ethnobotany, phytochemical and pharmacological information of this plant.

INTRODUCTION

Convolvulaceae family which is studded with Morning Glory Plants consist of 60 genera and more than 1,650 species of mostly herbaceous vines, but also trees, shrubs, herbs and food tubers included (Wikipedia contributors 1). About 20 genera and over 150 species have been reported from India (Sultana et al. 2016). Merremia is one of the genus of morning glory family. Members of the genus are often called as woodroses (Wikipedia contributors 2). Merremia dissecta (J) Hallier. is commonly called as “alamo vine” belonging to family convolvulaceae (Austin et al. 2007). The plant is cultivated in many parts of the world owing to its beneficial property. According to literature survey these plant has been used as condiment, medicine and ornamental. Traditional uses of this plant suggested the effectiveness against inflammation, colds, chest problems, sprains, urinary infection and scabies. Present review was made to illustrate and compile the total up-to-date information on various aspects of Merremia dissecta (J) Hallier.

Synonyms
Convolvulus dissectus
Ipomoea dissecta
Ipomoea sinuata
Operculina dissecta

Vernacular Name
English: Alamovine
Hindi: Nagin
Portuguese: Campainha
Spanish: Almendrillo
Chinese: Duo Lie Yu Huang- Cao
German: Queensland-Holzrose
French: rose de bois
Japanese: Kirehahirugao

Scientific Classification (Usda)

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Plantae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subkingdom</td>
<td>Tracheobionta</td>
</tr>
<tr>
<td>Superdivision</td>
<td>Spermatophyta</td>
</tr>
<tr>
<td>Division</td>
<td>Magnoliophyta</td>
</tr>
<tr>
<td>Class</td>
<td>Magnoliopsida</td>
</tr>
<tr>
<td>Subclass</td>
<td>Asterae</td>
</tr>
<tr>
<td>Order</td>
<td>Solanales</td>
</tr>
<tr>
<td>Family</td>
<td>convolvulaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Merremia Dennst. Ex Endl.</td>
</tr>
<tr>
<td>Species</td>
<td>Merremia dissecta (Jacq.)</td>
</tr>
</tbody>
</table>

Botanical Description

Merremia dissecta is a perennial herb grows in a human distributed region (Roadside, hedges). Leaves are alternate to 10 cm in length and palmately divided with 7-9 lobes, the lobe
margins are sinuate to dentate with an acuminate apex. The outline of entire leaf is suborbicular. Stem is hirsute with yellowish hairs. Inflorescence axillary, 1 to few flowered, the peduncles 5-10 cm long. Pedicels 1.5-2 cm long with thickened at apex. The flowers are actinomorphic and solitary. Calyx has 5 unfused sepals and 1.8-2cm long. Corolla funnel shaped, white with a purple throat, 3-4.5 cm long, stamens unequal, filament dilated near attachment. The superior ovary consist of 2 locules and numerous seeds. Fruits are capsular, globose and 1-2 cm in diameter. Seeds are black, subrotund and glabrous (Syed et al 2015; Wikipedia contributors 3; Sasidharan et al. 2020).

Plant Habit (Wiktrop)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Terrestrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Type</td>
<td>Perennial Herb</td>
</tr>
<tr>
<td>Foliage</td>
<td>Evergreen</td>
</tr>
<tr>
<td>Roots</td>
<td>Tap Roots</td>
</tr>
<tr>
<td>Type of Stem</td>
<td>Non Woody, Hirsute</td>
</tr>
<tr>
<td>Leaf Type</td>
<td>Sub orbicular</td>
</tr>
<tr>
<td>Leaf Arrangement</td>
<td>Alternate</td>
</tr>
<tr>
<td>Leaf Colour</td>
<td>Green</td>
</tr>
<tr>
<td>Plant Feature</td>
<td>Climber</td>
</tr>
<tr>
<td>Plant Utilities</td>
<td>Medicinal Plant</td>
</tr>
<tr>
<td>Season</td>
<td>Annual</td>
</tr>
<tr>
<td>Sunlight</td>
<td>Partial shade</td>
</tr>
<tr>
<td>Soil type</td>
<td>light soil but tolerates alkaline</td>
</tr>
<tr>
<td>Drainage</td>
<td>well drained</td>
</tr>
<tr>
<td>Propagation method</td>
<td>By Seed</td>
</tr>
</tbody>
</table>

Fruit Characteristics

<table>
<thead>
<tr>
<th>Fruit classification</th>
<th>Capsule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds</td>
<td>Two Locules, 4 seeded</td>
</tr>
</tbody>
</table>

Flower Characteristics

<table>
<thead>
<tr>
<th>Flower Colour</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower Type</td>
<td>Axillary</td>
</tr>
</tbody>
</table>

Geographical Distribution

Merremia dissecta is Native of Tropical and Subtropical America whereas distributed globally. In India, Sri Lanka, Myanmar, China, Pakistan Indonesia, Philippine, Australia, French Polynesia, Papua, New Guinea, Solomon Islands, Samoa, Tonga, and Seychelles (Staples et al. 2010)

Distribution in India

In India, the plant is observed in various regions but presence in a area like Kottayam, Alappuzha, Pathanamthitta, Thruvananthapuram districts of Kerala and Azamgarh, Gorakhpur districts of Uttar Pradesh have been reported (Sasidharan et al. 2020; Srivastava et al 2017)

Ethnobotanical Description

The plant Merremia dissecta have been used by the tribes and cultivated in various parts of world, owing to its ornamental, flavouring and medicinal properties. The plant extract is given in the form of decoction, infusion and as a solution. It was reported that the vines are splendent in the gardens of Malaysia and Australia. The odour of leaf extract resembles to the almond and thus used as a flavouring essence in cakes, sweet breads and candies. In Caribbean regions of united state the crushed leaves and infusion used as sedative, emollient, anti-inflammatory and also, reported to be effective against urinary infection, sprains, cold and scabies. The roots of Merremia dissecta have been eaten by tobas. The plant has importance as "folk" medicine in few regions of India (Austin et al. 2007). In Nigeria, an infusion of leaf used as important ingredient of snakebite remedy and also planted to protect residence against snakes. Due to its characteristic odour the leaves of plant are
used for making liqueurs in India (Oyen et al. 2020)

**Therapeutic Uses of Some Important Merremia Species**

Merremia species consist of number of medicinally important plants and many of them are scientifically evaluated and reported for various activities.

- Merremia tridentata (L.) Hall. f. also called as “Prasarin” in sanskrit reported to possess anti-inflammatory, analgesic, antiarthritic, antioxidant, wound healing activity, antidiabetic against streptozocin induced model and antiulcer activity.
- Merremia emerginata also known as ipomoea reformins having anticanancer, antiinflammatory, antiulcer, antiarthritic, antipyretic, antimicrobial, anti-inflammatory, analgesic and hepatoprotective potential.
- Merremia peltata and Merremia aegyptica having antibacterial activity.

**Phytochemistry**

The members of convolvulaceae are wealthy of phytoconstituents. A reported study on various taxa shown that various pharmacologically important phytoconstituents like alkaloids, glycosides, tannins, carbohydrates, saponins, proteins, phytosterols, terpenoids, phenols and flavonoids were present in leaves and stems. As the secondary metabolites having correlation with biological activities such as anti-inflammatory, anti-oxidants, anti-osteoorthic, analgesic, antidiabetic, anti-microbial and hepatoprotective (Mascarenhas et al. 2017). Phytochemical evaluation of Merremia dissecta reveled presence of various phytoconstituents like glycosides, alkaloids, tannins, saponins, amino acid, phenols and flavonoids (Jasim et al. 2018; Joshi et al. 2018; Devhade et al. 2015).

**Glycosides**

In 1989 Nahrstedt et al. isolated cyanogenic compounds from the leaves and seeds of Merremia dissecta namely prunasin and 6-o-melonylprunasin similarly. In 1990 it was reported that seeds contain acylated cyanogenic glycoside as amygdalin, its 6″-(4-hydroxy)benzoate and its 6″-(4-hydroxy) - e – cinnamate (Nahrstedt et al. 1989; 1990)

**Alkaloids**

Weigl et al. (1992) isolated novel tropane alkaloids from the roots of Merremia dissecta, tropan-3a-yl 4″-methoxybenzoate, nortropan-3a-yl 4″-methoxybenzoate (merresectine A) and merresectine B. Then, later 32 alkaloids have been isolated in the roots, which consist of 26 tropanes and 6 pyrrolidines. The alkaloids like 3a-(4-methoxybenzoyloxy) nortropanenn (merresectine A), 3α-kurameroloyxo tropean (merresectine B), 3α-nervogenoloyxo tropean (merresectine C), 3α-{4-(β-D-glucopyranosyl)3-methoxy-5-(3-methyl-2-butenyl)} benzoyloxy] tropean (β-D-glucoside of D). Moreover, the novel 3a, 6β-di-(4-methoxy benzoyloxy) tropean (merredissine) were present (Austin et al. 2007; Jenett-Siens et al. 2005).

**Phenols and Flavanoids**

The remarkable amount of phenols and flavanoids has been observed in the leaves of Merremia dissecta. Specifically, the quantity of phenols and flavanoids was higher in alcoholic extract as compared to aqueous extract (Jasim et al. 2018).

**Other Constituents**

Beside richness of glycosides, alkaloids, phenols and flavanoids other constituents also have been reported. The volatiles like germacrene d, β-caryophyllene, spathulenol, β-elemane and 6-elemane as well as benzyl alcohol, benzoic acid, calystegineB2, lupeol, sitosterol, 6methyl heptadecanoyl caffeate and stigmasterol also reported (Austin et al. 2007; Luciardi et al. 2016).

**Pharmacological Relation with Bioactive Constituents**

β-caryophyllene is a pharmacologically important constituent effective against various pathological conditions. β-caryophyllene reported to possess Anti-inflammatory, Anti-atherosclerosis, Anti-cancer (colon, breast, pancreas, lymphoma, melanoma), Antioxidant, Anticonvulsant, Analgesic, Myorelaxant, Sedative, Antidepressant, Anxiolytic, Antimicrobial and also effective against Neurodegenerative diseases (Parkinson’s disease, Alzheimer’s disease, multiple sclerosis, stroke), Osteoporosis, Steatohepatitis and Neuroprotective. The potent anti-inflammatory activity is exerted by inhibiting the inflammatory mediators. Medicinal plants such as Syzygium aromaticum, Zingiber officinale, Piper nigrum and Rosmarinus officinalis etc. having β-caryophyllene as a major constituent and thus proved as pharmacologically superior (Francomano et al. 2019). The GC-MS analysis of Merremia dissecta reveled presence of β-caryophyllene (Joshi et al. 2018).

Spathulenol is a sesquiterpenoid (ChEBI). A study conducted on Psidium guineense isolated spathulenol as a major constituent. A study reported antioxidant activity by DPPH, ABTA and MDA method, anti-inflammatory activity by carrageenan induced model, anti-proliferative activity by sulforhodamine B assay and anti-Mycobacterium by REMA method(Nascimento et al 2018). Also having anaesthetic, vasodilating, immunomodulatory and cytotoxic potential (ChEBI; Chem Faces).

Amygdalin is a glycoside present in a Merremia dissecta. A literature review on pharmacological uses of amygdalin found to be effective as antiasthmatic, anti-hyperglycemic, antinoceceptive, antiinflammatory, immunomodulatory and anticarcinogenic (Qadir et al. 2017).

A study reported presence of calystegine B2 in leaves and flowers of Merremia dissecta (Schimming et al. 2005). Calystegine B2 is a potent inhibitor of α-glucosidases and R-galactosidases. Thus, having antidiabetic activity (Gaikwad et al. 2014).

**Chemical structure of key bioactive constituents**

![Figure 4 Prunasin](Image 365x119 to 516x191)
DISCUSSION

The present study reveals that a common weed plant Merremia dissecta is a potentially useful medicinal plant with pharmacological properties. The plant have been used by various tribes and cultivated for various purposes in different parts of the world. Traditionally, the plant have been used against inflammation, colds, sprains, urinary infection and scabies. The plant is also grown as ornamental and used as flavouring agent. The plant shows the presence of many phytochemicals which may responsible for various pharmacological activities. The reported pharmacological studies showed antimicrobial, antifungal and antipathogenic activities. On the basis of study it can be concluded that Merremia dissecta has a leading capacity to prove as effective source for treatment and control of various diseases in future.

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