Classical and Modern review of *Enicostemma litorale* Blume

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Abstract:

*Enicostemma littorale* is one of the traditional medicines used mainly in Gujarat, Madhya Pradesh, and Rajasthan as a stomachic, tonic, carminative¹ and appetizer. E. littorale is also prescribed as a single or in combination in the form of Vati (Pills) for the treatment of type 2 diabetes in Ayurveda. Recent studies based on the anti-diabetic effect of E. littorale suggesting its role to reduce blood glucose and increase serum insulin level. Significant improvement in kidney function, lipid profile, systolic and diastolic blood pressure also reported. Moreover, it possesses multidimensional therapeutic properties viz. antimicrobial activity, antihelminthic activity, antinociceptive effect, antioxidant activity, antiulcer activity, anti-inflammatory activity, antitumour activity, hepatoprotective activity, hepatomodulatory activity, and antihyperlipidaemic activity including the hypoglycemic activity, antihyperinsulinemic activity, and aibetic neuropathy activity. Present review describes classical and modern literature based on the Enicostemma littorale.

Keywords: *Enicostemma littorale*, Diabetes, Ayurved

INTRODUCTION

Ethnomedicine is the knowledge based on the curative and palliative effects of certain herbs, animals and minerals. This knowledge is the outcome of trial and error practices of the several generations. Ethnomedicine is contributed to the evolution of different systems of medicine viz. Ayurveda, Siddha, Unani, Naturopathy including modern medicine. It has continuously providing the information about the various effective drugs for the exploration of their therapeutic profile. *Enicostemma littorale* is one of the traditional medicines used mainly in Gujarat, Madhya Pradesh, and Rajasthan as a stomachic, tonic, carminative¹ and appetizer. E. littorale is also prescribed as a single or in combination in the form of Vati (Pills) for the treatment of type 2 diabetes in Ayurveda. Recent studies based on the anti-diabetic effect of E. littorale suggesting its role to reduce blood glucose and increase serum insulin level. Significant improvement in kidney function, lipid profile, systolic and diastolic blood pressure also reported. Moreover, it possesses multidimensional therapeutic properties viz. antimicrobial activity, antihelminthic activity, antinociceptive effect, antioxidant activity, antiulcer activity, anti-inflammatory activity, antitumour activity, hepatoprotective activity, hepatomodulatory activity, and antihyperlipidaemic activity including the hypoglycemic activity, antihyperinsulinemic activity, and diabetic neuropathy activity. Present review describes classical and modern literature based on the Enicostemma littorale.
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Mamajjaka (Enicostemma litorale Blume)

This plant is first time mentioned in Shodhal nighantu (12th century) in lakshamanadivarg. It is a traditional popular herb used in the treatment of diabetes mellitus. This plant is also used in combination with other drugs. Number of polyherbal formulations are available in the market in which mamajjaka is used as an important ingredient like Diasol, Dihar. Mamajjaka ghanavati i.e. pill form of ghana used for treating the type-2 diabetes by reducing blood glucose and increase serum insulin level.

**References found in Nighantus about Mamajjaka:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nighantu</th>
<th>Period</th>
<th>Varga</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sodhala Nighantu</td>
<td>12th century AD</td>
<td>Lakshamandivarga</td>
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<tr>
<td>2.</td>
<td>Saligram Nighantu</td>
<td>19th century AD</td>
<td>Parishishtabhaga</td>
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<td>3.</td>
<td>Nighantu Adarsh</td>
<td>20th century AD</td>
<td>Kiratadigavar</td>
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<td>4.</td>
<td>Priya Nighantu</td>
<td>20th century AD</td>
<td>Satapushpavidarga</td>
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</tbody>
</table>

**Table 1.1: Mamajjaka in Nighantus**

**Taxonomic position of Enicostemma litorale**

- **Kingdom**: Plantae
- **Subdivision**: Angiospermae
- **Class**: Dicotyledonae
- **Subclass**: Gamopetalae
- **Series**: Bicarpellatae
- **Order**: Gentianales
- **Family**: Gentianaceae
- **Genus**: Enicostemma
- **Species**: littorale

**Vernacular name**

- **Sanskrit**: Mamajjaka, Naahi, Tikshanpatra
- **Hindi**: Naahi, Chhota Chirayata
- **Gujarati**: Mamejavo
- **Bengal**: Nagajivha
- **Tamil**: Vellarugu or Vallari
- **English name**: White head, Indian Gentian

**Ayurvedic properties of mamajjaka**

- **Rasa**: Tikta
- **Guna**: Laghu, Ruksha
- **Virya**: Ushna
- **Vipaka**: Katu
**Doshakarma**: Kaphapittashamak

**Description of plant:**

*Enicostemma littorale* Blume (Mamajjaka) is a glabrous perennial herb\(^8\) attaining a height of 5-20 inches, distributed throughout India up to a height of 1500 feet. Drug consist of dried whole plant of *E. littorale* Blume (*Enicostemma hyssopifolium*) belonging to the family Gentianaceae.

**Figure:** 1 Habitat of *Enicostemma littorale* Blume.

**Macroscopic characteristics**

**Stem** is cylindrical, glabrous, readily rooting at nodes; no odour; taste-bitter. **Leaves** are sessile, longer than internodes; 5-8× 0.3-1 cm. Midrib depressed on adaxial side. **Flowers** are white in colour arranged in a cluster, numerous in the axils of each pair of leaves. Calyx tube 1-2 mm, unequal lobes 0.7-1.5× 0.4-0.7 mm. Corolla tube 3.5-6mm. **Fruits** are capsule, globes with pale, ridged ovate seeds 0.4-0.5mm in diameter. This plant is used as a folk medicine in the treatment of inflammation, diabetes mellitus and to regulate bowel functions\(^9\) in western and southern India. **Roots** are 2-4mm in dia., taproot dull white, surface slightly rugose.

**Figure:** 2 Leaves, flowers, and stem of *Enicostemma littorale* Blume.
Microscopic characteristics

**Leaf**: Presence of prominent bulge abaxially in transverse section of the midrib of the leaf, collenchyma cells, vascular bundle, and parenchyma cells in ground tissues. Epidermis is single layered, papillae on the epidermis, anisocytic stomata. **Stem**: Quadrangular stem and having narrow wings, single layered epidermis, collenchyma and parenchyma are present in winged corners, uniseriate medullary rays, presence of starch grains. **Root**: Transverse section shows single layered epidermis, unicellular trichomes, uniseriate medullary rays. Pith is absent.¹⁰

**Distribution:**

E. littorale is widely distributed in South America, Africa, and Asia. It is found in all over the India up to the height 1500 feet, mostly in the coastal region.¹¹

**Chemical constituents of Enicostemma littorale:**

*Enicostemma littorale* has chemical constituents like sterols, satechins, triterpenoids, volatile oil, and alkaloids. Main chemical constituents are betuline, triterpene sapogenin, and swertiamarin. It also contains erythrocentaurin reported to have α-amylase inhibitory activity. Heptacosane, nonacosane, myristic acid, stearic acid and oleic acid are also present in minor quantities.¹² Monoterpene alkaloids like enicoflavine and Gentiocrucine are also present.¹³

**Part used**: Whole plant

**Dose**: 1-3g churna, 50-100ml kwatha.⁷

**Ayurvedic pharmacology:**⁷

**Action on digestive system**: Deepan, aamapachan, yakritutejak, and krimighan.

**Action on circulatory system**: Rakatshodhak and shothhar.

**Action on urinary system**: Parmehaghan.

**Action on skin**: Kushatghan.

**Reported pharmacological actions:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Pharmacological activity</th>
<th>Part used</th>
<th>Extract</th>
<th>Model</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anthelmintic activity¹⁴</td>
<td>Aerial part</td>
<td>Ethanolic extract</td>
<td>-</td>
<td>-</td>
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<tr>
<td>2.</td>
<td>Analgesic and anti-inflammatory activity¹⁵</td>
<td>Whole plant</td>
<td>Methanolic extract</td>
<td>Freund’s adjuvant-induced arthritis</td>
<td>150mg/Kg</td>
</tr>
<tr>
<td>3.</td>
<td>Cardio protective and antihypertensive effect¹⁶</td>
<td>-</td>
<td>Water extract</td>
<td>-</td>
<td>1.5g/100g body wt./day</td>
</tr>
<tr>
<td>4.</td>
<td>Antidiabetic activity¹⁷,¹⁸</td>
<td>Whole plant</td>
<td>Water extract</td>
<td>Alloxan-induced diabetic rats.</td>
<td>2g/Kg</td>
</tr>
<tr>
<td></td>
<td>Whole plant</td>
<td>Methanolic extract</td>
<td>Alloxan-induced diabetic rats.</td>
<td>2.5g/Kg/day</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Hepatoprotective activity¹⁹</td>
<td>Aerial part</td>
<td>Water extract</td>
<td>Paracetamol-induced hepatotoxicity in</td>
<td>200mg/Kg</td>
</tr>
<tr>
<td></td>
<td>Pharmacological Actions</td>
<td>Treatment</td>
<td>Extract Type</td>
<td>Dose/Model</td>
<td></td>
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<tr>
<td>6.</td>
<td>Antimalarial activity(^{20})</td>
<td>-</td>
<td>Methanolic extract</td>
<td>529.04 μg/ml (swertiamarin)</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Antiulcer activity(^{21})</td>
<td>Aerial part</td>
<td>Methanolic extract</td>
<td>Aspirin-induced gastric ulcer</td>
<td>200mg/Kg</td>
</tr>
<tr>
<td>8.</td>
<td>Antiobesity activity(^{22})</td>
<td>-</td>
<td>Water &amp; ethanolic extract</td>
<td>High fat diet-induced obesity</td>
<td>200,250,400, 500mg/Kg</td>
</tr>
<tr>
<td>9.</td>
<td>Antihyperlipidemic activity(^{23})</td>
<td>-</td>
<td>Methanolic extract</td>
<td>Poloxamer-407-induced hyperlipidaemic model</td>
<td>50mg/Kg (swertiamarin)</td>
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<tr>
<td>10.</td>
<td>Antipyretic activity(^{24})</td>
<td>Whole plant</td>
<td>Ethanolic extract</td>
<td>-</td>
<td>260-780mg/Kg</td>
</tr>
</tbody>
</table>

**Table 1.2:** Pharmacological actions of mamajjaka

**Conclusion:**

Classical and modern literature based on the *Enicostemma Littorale* describing its role in the treatment of the many diseases. It is also reported to have wide array of therapeutic properties including antimicrobial activity, antihelmintic activity, antinociceptive effect, antioxidant activity, antiulcer activity, anti-inflammatory activity, antitumour activity, hepatoprotective activity, hepatomodulatory activity, and antihyperlipidaemic activity including the hypoglycemic activity, antihyperinsulinemic activity. However, there is a need of clinical data and their scientific validation in order to establish it as a medicine.

**References**