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Unveiling the Potential of *Ampelocissus indica*: A Comprehensive Review

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Abstract : Traditional medicinal plants have been used to prevent and treat various ailments, and they play a major role in developing new therapies and maintain health. The climbing shrub traditionally known as *Ampelocissus indica* belongs to the Vitaceae family. Due to its various therapeutic properties, *Ampelocissus indica* has been used in traditional medicine. Flavonoids, Alkaloids, Tannins, Saponins, carbohydrates, phytosterols and phenolic compound are major phytoconstituents that make *Ampelocissus indica* a valuable plant in traditional medicine for treating various diseases and promoting health. Various studies have been performed with *Ampelocissus indica* for its anti-inflammatory, antioxidant, diuretic, antidiabetic and hepatoprotective activities.

Key words: *Ampelocissus indica*, Vitaceae, Anti-inflammatory, Antidiabetic, Hepatoprotective

I. INTRODUCTION

Ampelocissus indica, a climbing shrub and member of the Vitaceae family. *Ampelocissus indica* also known as red stemmed wild grape wine, because the stem of the shrub is red coloured, it is found in Peninsular India and Sri Lanka. It has simple and ovate leaves, reddish brown flowers and spherical shaped berries like grapes. Roots are the useful part of this plant, the root tuber contains different phytochemicals like carbohydrate, flavonoids, phenols, tannins, alkaloids, saponin and phytosterols. This plant is traditionally used as an anti-inflammatory medicinal plant.

II. GENERAL INFORMATION

Ampelocissus indica traditionally known as Chembravalli documented in Hortus Malabaricus and some other traditional books in Kerala (Chikitsamajari, Arogyakalpadrumam, Yogamrutham and Vaidyatarakam) used for inflammatory skin diseases and wound healing. According to Chikitsamanjari and Yogamrutam the plant is used to cure vidradi(abscess), and in Arogyakalpadrumam the plant is used to treat Nelkarappan (one type of skin disorder that affects infants), Gudhakushta (type of ulcer that affecting on perianal area)and vrana(ulcer).

- **SYNONYMS**

Homotypic synonym: Cissus indica (L.) Walp and Vitis Indica L.
Heterotypic Synonym: Ampelocissus arnottiana Planch

- **CLASSIFICATION**

Kingdom	Plantae
Phylum	Streptophyta
Class	Equisetopsida
Subclass	Magnoliidae
Order	Vitales
Family	Vitaceae
Genus	Ampelocissus
Species	Amplelocissus indica

III. MORPHOLOGICAL CHARACTERISTICS

- **ROOT SYSTEM**

The root system of Ampelocissus indica is characterized by a robust, woody taproot, supplemented by adventitious roots emerging from stem nodes, and a network of fine, branching fibrous roots that become woody and develop a thick, bark-like covering with age. This extensive, widely spreading root system anchors the plant and efficiently absorbs water and nutrients, featuring greyish-brown bark, a soft white or pale yellow interior, and root hairs, particularly in younger roots. Notably, the roots possess the ability

to produce new shoots and roots, facilitating vegetative spread. By anchoring the plant, absorbing essential resources, storing nutrients, and driving new growth and vegetative propagation, the roots play a crucial role in enabling Ampelocissus indica to flourish in diverse environments. Ultimately, the root system is optimally adapted for absorption, storage, and vegetative propagation, ensuring the plant's success.

- **STEM FEATURES**

The stem of Ampelocissus indica is a sturdy, woody structure that supports the plant's climbing habit, characterized by its cylindrical shape, smooth greyish-brown bark, and shallow grooves or ridges, especially in younger sections. As a climber, the stem uses tendrils to ascend trees or other supports, branching extensively with many lateral shoots and tendrils. The stem is hairless or nearly so, with few or no trichomes, and features small, raised lenticels (breathing pores) scattered along its length. Prominent nodes mark the points where leaves and tendrils attach, separated by relatively long internodes that enable the plant to climb extensively. Overall, the stem's robust and branched structure, combined with its climbing ability, allows Ampelocissus indica to thrive in its environment.

- **LEAF STRUCTURE**

The leaves of Ampelocissus indica are simple, alternate, deciduous, and ovate or cordate in shape, measuring 5-15 cm long and 3-8 cm wide, with an acuminate apex and cordate or rounded base. The margins are entire or toothed, and the surface is dark green above and pale below, with a pinnate venation pattern featuring a prominent midrib and lateral veins. The petiole is slender and grooved, measuring 2-5 cm long, and stipules are small, membranous, and caducous. Additionally, the leaves are thin and papery in texture, hairless or sparsely hairy, with a few small yellowish glands on the underside, making them a distinctive and diagnostic feature for identifying the species.

- **FLOWER STRUCTURE**

The flowers of *Ampelocissus indica* are small, inconspicuous, and greenish-yellow, measuring about 2-3 mm in diameter, and are arranged in 5-15 cm long panicles or corymbs. They are actinomorphic, hypogynous, and complete, featuring all four whorls: sepals, petals, stamens, and carpels. The male flowers have five free, erect stamens of equal length, with yellow, sagittate anthers that dehisce longitudinally. In contrast, the female flowers have two to four fused carpels with a short, stout style and a capitate or bilobed stigma. The flowers are fragrant, emitting a sweet, floral scent, and bloom in the summer months, typically from May to July, preceding the development of fruit.

- **FRUITS STRUCTURE**

The fruit's purple or black coloration serves as an attractive signal to animals, indicating its ripeness and readiness for consumption. As the fruit is eaten, the seeds are dispersed, allowing the plant to propagate and spread to new areas. The juicy pulp of the fruit is sweet and flavourful, making it a desirable food source for various birds, mammals, and insects. The fruit's small size and spherical shape make it easy to consume whole, facilitating efficient seed dispersal. Overall, the fruit of *Ampelocissus indica* plays a crucial role in the plant's life cycle, enabling it to reproduce and disperse effectively

IV. HABITAT AND ENVIRONMENTAL CONSIDERATION

Ampelocissus indica is a versatile species with a wide range of utilizations and habitat adaptations. Its habitat spans across tropical and subtropical regions, where it thrives in diverse environments, including dense forests, open woodlands, scrublands, and rocky outcrops. The species exhibits remarkable adaptability, ascending trees, rocks, and other supports as a climber or trailer, and tolerating various soil types, from sandy to rocky.

V. DISTRIBUTION

Ampelocissus indica boasts an extensive distribution across tropical and subtropical zones in Asia, Africa, and the Pacific Islands. Its geographical scope encompasses various countries, including:
- Tropical Asia: India, Sri Lanka, Bangladesh, Nepal, and parts of Southeast Asia, such as Malaysia, Thailand, and the Philippines.
- Tropical Africa: West, Central, and East Africa, comprising nations like Nigeria, Cameroon, Democratic Republic of Congo, and Tanzania.
- Pacific Islands: Fiji, Samoa, Tonga, and Vanuatu.

VI. PHYTOCHEMICAL PRESENTS

Ampelocissus indica contains a diverse array of phytochemicals, including alkaloids such as isoquinoline and indole alkaloids, phenolics like phenolic acids and flavonoids, saponins comprising triterpenoid and steroidal saponins, flavonoids including flavanols glycosides, flavanols, and anthocyanins, proteins like various enzymes and storage proteins, and carbohydrates consisting of polysaccharides like starch, cellulose, and hemicellulose, as well as oligosaccharides like sugars and glycosides.

VII. PHARMACOLOGY OF AMPRLOCISSUS INDICA

1. ANTI- SNAKE VENOM ACTIVITY

Ethanolic extract of *A. indica* have anti snake venom effect. Animal study involving Swiss Albino mice and in vitro studies, have demonstrated *A. indica* has ability to neutralize the toxicity induced by bioactive compounds presents in Naja naja venom with a a focus on reducing lethality, reversing anticoagulant effects, and normalizing bleeding time

2. ANTI -DIABETIC ACTIVITY

Acetone extract of the *A. indica* led to marked inhibition of α-glucosidase . Research has shown that the acetone fraction of *AI* possesses significant antiglycation properties, suggesting its potential as a therapeutic agent for mitigating the harmful effects of glycation and oxidative stress associated with advanced glycosylation end product.

3. HEPATOPROTRCTIVE ACTIVITY

Methanolic extract of *A. indica* at 250mg/kg, 500mg/kg in rats gave protective action against liver injury induced by CCl_4 .The hepatoprotective effects of methanolic extract of *A. indica* are largely attributed to its antioxidant properties, which likely involve the reduction of lipid peroxidation, level of serum enzymes, bilirubin thereby minimizing cellular damage. Notably, GC-MS analysis revealed that Hexadecanoic acid ethyl ester is the primary constituent of MEAI, suggesting that this compound may be the key contributor to its antioxidant and hepatoprotective activities.

4. DIURETIC ACTIVITY

Leaves of *Ampelocissus indica* have been shown to possess a significant diuretic effect in experimental animals. A study conducted on rats has suggested that aqueous and alcoholic extracts of *A. indica* leaves have increased urine volume and cationic and anionic extraction

5. ANTI-INFLAMMATORY ACTIVITY

Ampelocissus indica is a medicinal plant used for inflammatory skin ailments and documented in Hortus Malabaricus and traditional Ayurveda books. Decoction and extracts of *A.indica* showed anti-inflammatory effects in acute(Carrageenan induced rat paw edema) and chronic inflammation in rats by a significant down regulation of cytokines such as IL-1β and TNF-α. Various studies were performed to determine the anti-inflammatory effect of *Ampelocissus indica.*

6. ANTIOXIDANT ACTIVITY

The antioxidant activity of *Ampelocissus indica* has been reported. *A.indica* extract has significant ability to scavenge highly reactive free radicle and it was estimated using 2,2- diphenyl-picryl-hydroxyl (DPPH) free radicle assay. These findings support the traditional use of *Ampelocissus indica.*

VIII. CONCLUSION.

Ampelocissus indica, a climber plant native to India and Sri Lanka, has been found to possess a plethora of bioactive compounds, including flavonoids, alkaloids, and glycosides, which contribute to its diverse pharmacological properties. The existing literature reveals its potential as an antiproliferative, antioxidant, anti-inflammatory and antidiabetic agent, warranting further investigation. The traditional uses of *Ampelocissus indica* in folk medicine are supported by scientific evidence, highlighting its potential in preventing and managing various diseases. Future research should focus on isolating and characterizing its bioactive compounds, elucidating their mechanisms of action, and exploring its therapeutic applications. The findings of this review underscore the importance of conserving and exploring the medicinal properties of *Ampelocissus indica* for the development of novel therapeutic agents.

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