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A Review on Medicinal Properties of Blepharis repens

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ABSTRACT: Blepharis repens (family Acanthaceae) is a widespread medicinal plant notable for its long-standing role in traditional healthcare approaches. Recent investigations have increased interest in the species due to its varied phytochemical contents and promising biological activities. Phytochemical analyses confirm the presence of alkaloids, flavonoids, phenolics, tannins, glycosides, terpenoids, and additional compounds, which collectively contribute to its demonstrated pharmacological effects. Reported bioactivities of B. repens include anti-inflammatory, antimicrobial, antioxidant, analgesic, wound-healing, antidiabetic, and hepatoprotective actions. Furthermore, traditional practice supports its use for treating fever, skin disorders, respiratory ailments, and general weakness.The evidence from contemporary and traditional sources collectively establishes B. repens as a plant of notable therapeutic potential and a valuable candidate for natural product drug development. Nonetheless, future research should include comprehensive toxicological assessments and clinical studies to verify medicinal claims and identify novel applicationsThis review aims to provide a consolidated overview of the key medicinal attributes, active chemical constituents, and therapeutic significance of Blepharis repens, drawing upon published literature, reference books, and reliable scientific databases.

KEYWORDS: Blepharis repens, medicinal properties, phytochemicals, pharmacological activities, traditional medicine

I. INTRODUCTION

Medicinal plants play a crucial role in traditional healthcare systems and continue to serve as important sources of therapeutic agents [1,2]. India possesses a rich heritage of medicinal flora utilized in Ayurveda, Siddha, and folk medicine for centuries [3,5]. Scientific validation of such plants is essential to substantiate traditional claims and discover novel bioactive compounds [11,12]. The genus Blepharis (Family: Acanthaceae) comprises species adapted to arid and semi-arid environments and is widely distributed in Africa and the Indian subcontinent [7,9]. Several species of Blepharis are known for their anti-inflammatory, analgesic, antimicrobial, and wound-healing properties [11,14].

Blepharis repens (Vahl) Roth is a prostrate, creeping herb commonly found on rocky substrates of the Deccan Plateau, particularly in Melghat and Amravati regions of Maharashtra [7,10]. The plant is popularly known as “Hadsan” and is traditionally used for the treatment of bone fractures, joint pain, and inflammation [5,13]. In Ayurvedic literature, the drug “Utingan” is described in texts such as Bhavaprakasha Nighantu and is classified as Vajikaran and Mutral [3,4]. Although Blepharis edulis is the primary source, B. repens is used as a regional substitute in Vidarbha [2,3]. Despite its extensive traditional use, scientific studies on the phytochemical and pharmacological properties of B. repens remain limited [7,11]. Therefore, the present review aims to compile and critically analyze available literature on the medicinal properties of Blepharis repens to bridge the gap between traditional knowledge and modern scientific research.

II. TAXONOMY AND BOTANICAL DESCRIPTION:

Kingdom: Plantae
Order: Lamiales
Family: Acanthaceae
Scientific Name: Blepharis repens (Vahl) Roth
Synonyms: Blepharis molluginifolia Pers., Acanthus repens Vahl.
Vernacular Names: Hadsan (Marathi), Hadsandhi (Hindi), Haridachchu (Kannada).
Habit: A prostrate, spreading herb with hispid stems. Leaves are sessile, occurring in whorls of four, with entire margins. Flowers are solitary, sessile, and typically blue or pinkish-purple.

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III. ANCIENT AND TRADITIONAL MEDICINAL USES

Ayurvedic Context

In the Ayurvedic pharmacopeia, the drug "Utingan" is mentioned in texts like the Bhavaprakasha Nighantu. It is classified as Vajikaran (aphrodisiac) and Mutral (diuretic). While Blepharis edulis is the primary source, B. repens acts as a regional source in Vidarbha (Shweta-Utingan).

Rasa (Taste): Tikta (Bitter) and Madhura (Sweet).

Virya (Potency): Sheeta (Cooling).

Guna (Quality): Guru (Heavy) and Snigdha (Unctuous).

Ethnomedicine (The "Hadsan" Tradition)

The specific use of B. repens for orthopedics is unique to tribal belts in Maharashtra and Karnataka.

IV. METHOD AND RESULTS

Fracture Healing: A paste of the whole plant is mixed with egg white or black gram (Urad dal) flour and applied as a poultice (Leap) over fractures to accelerate bone knitting.

Wound Care: The leaf juice is boiled with sesame oil to treat deep cuts, acting as a styptic and antiseptic agent.

Phytochemical Profile :

Qualitative Chemical Analysis

The medicinal efficacy is attributed to secondary metabolites. The following chemical reactions confirm their presence:

A. Detection of Alkaloids (Mayer's Test)

Alkaloids act as analgesic agents.

Principle: Potassium mercuric iodide reacts with the basic nitrogen in alkaloids to form a complex.

Reaction:

Alkaloid + K_2HgI_4 → Cream coloured ppt

B. Detection of Flavonoids (Shinoda Test)

Flavonoids like Apigenin provide antioxidant benefits.

Principle: Reduction of the flavonoid core by Magnesium in the presence of acid.

Reaction:

Flavonoid + Mg + 2HCl → Reduced Flavonoid (Pink/Red) + $MgCl_2$ + H_2

C. Detection of Phytosterols (Salkowski Reaction)

Phytosterols (\beta-Sitosterol) are essential for the "bone-joining" activity.

Reaction:

Extract + Chloroform + Conc. H_2SO_4 → Reddish-brown layer at interface (Steroidal ring confirmation).

Mechanism of Action:

Antioxidant Activity:

The plant exhibits strong free radical scavenging activity, primarily due to phenolic content. The mechanism is evaluated using the DPPH radical.

Reaction Mechanism:

DPPH* (Purple) + Plant-OH → DPPH –H (Yellow) + Plant –O*

(Where Plant-OH represents the phenolic donor from B. repens)

Pharmacological Profile: Scientific Validation

Bone Healing and Osteogenic Activity

Recent studies on the ethanol extract of the whole plant have demonstrated accelerated callus formation in murine fracture models. The presence of anabolic steroidal compounds (\beta-sitosterol) stimulates osteoblast differentiation and mineralization, validating the "Hadsan" folklore.

Anti-inflammatory and Anti-arthritic:

In carrageenan-induced edema models, B. repens extracts showed a significant reduction in paw volume. The mechanism involves the inhibition of the Cyclooxygenase (COX) pathway, similar to non-steroidal anti-inflammatory drugs (NSAIDs).

Antimicrobial Activity:

The extracts have shown significant Zones of Inhibition (ZOI) against pathogens such as Staphylococcus aureus and Escherichia coli. This supports its use in preventing infections in open wounds.

Green Synthesis Potential (Nanobiotechnology) :

In the context of modern material science, Blepharis repens leaves serve as an eco-friendly bio-factory.

Mechanism: The phytochemicals (specifically flavonoids) act as reducing and capping agents.

Synthesis Reaction (Silver Nanoparticles):

Ag^+ + Flavanoids (Reductant) → Ago(NP) + Oxidized Flavonoids

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This route avoids toxic chemicals like sodium borohydride, making it a sustainable alternative for synthesizing antimicrobial nanoparticles.

V. CONCLUSION

Blepharis repens is a reservoir of phytosterols, flavonoids, and alkaloids. This review establishes a scientific basis for its traditional use in orthopedics ("Hadsan") and internal medicine ("Utingan"). The plant shows immense potential not only as a source of herbal drugs for osteoporosis and arthritis but also as a bio-reductant in the green synthesis of metallic nanoparticles. Further research should focus on the isolation of specific bioactive molecules.

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