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Review Article

Psoralea corylifolia L. (Babchi): A Comprehensive Review of Its Phytochemistry, Pharmacology and Ethnomedicinal Applications in the AYUSH (Unani) System of Medicine

Abudullah ^{1*}, Yasmeen Khan ², Labeeb Shaida ², Abdul Kabeer ², Mohd. Noman Taha ¹¹ Assistant Professor Department of Ilmul Advia (Pharmacology) Deoband Unani Medical College Hospital & research Centre Deoband-247554² Department of Ilmul Advia (Pharmacology) National Research Institute of Unani Medicine for Skin Disorders Hyderabad-500038

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Abstract



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*For Correspondence:

Abudullah, Assistant Professor Department of Ilmul Advia (Pharmacology) Deoband Unani Medical College Hospital & research Centre Deoband-247554

Psoralea corylifolia L., commonly known as *Babchi*, is a well-known medicinal plant that has been utilized for centuries in traditional medical systems such as Ayurveda, Siddha, and particularly the Unani system of medicine, where it is referred to as *Babchi*. Belonging to the Fabaceae family, *P. corylifolia* is native to tropical and subtropical regions, including China, South Africa, and extensively across the Indian subcontinent—namely Maharashtra, West Bengal, Uttar Pradesh, Rajasthan, Karnataka, Bihar, and the Deccan plateau.

In the Unani system, different parts of the plant are used therapeutically: roots for dental caries; leaves for diarrhoea; fruits for conditions such as anaemia, asthma, bronchitis, dysuria, inflammation, and vomiting; and seeds for skin conditions like scabies, ulcers, vitiligo, leucoderma, eczema, leprosy, and psoriasis. Phytochemical investigations have revealed more than seventy bioactive compounds, including flavonoids, coumarins, Quinone's, phenols, benzofurans, benzopyrans, sesquiterpenoids, triterpenes, and steroids. Various pharmacological activities have been reported, such as anti-inflammatory, hepatoprotective, hemostatic, antioxidant, antimicrobial, antibacterial, antifungal, anti-obesity, antiviral, anti-mutagenic, anti-filarial, estrogenic, anticancer, anti-asthmatic, anti-diabetic, anti-aging, and immunomodulatory properties. Additionally, potential therapeutic effects have been observed in Alzheimer's disease and alopecia areata.

Several traditional and proprietary Unani formulations such as *Roghan Babchi*, *Sufoof-e-Babchi*, *Zimad-e-Bars*, *Habb-e-Bars*, and *Habb-e-Hindi* are commercially available for therapeutic use. This review aims to consolidate classical Ethnomedicinal knowledge and recent pharmacological research on *P. corylifolia* to facilitate its broader integration into evidence-based phytomedicine.

Keywords. *Psoralea corylifolia*, Babchi, Dermatological disorders, Unani medicine.

Introduction:

The Unani system of medicine is one of the oldest traditional healthcare systems, with centuries of practice in the prevention and treatment of various ailments. It is founded upon the theory of maintaining homeostasis through the balance of four humours (*akhlāt*)—blood, phlegm, yellow bile, and black bile—and the individual temperament (*mizāj*), regulated by six essential factors (*asbāb-e-sittah zarūriyya*)¹. Disease management involves a combination of regimental therapy (*ilāj bi'l-tadbīr*), dietary therapy (*ilāj bi'l-ghidhā*), and pharmacotherapy (*ilāj bi'l-dawā*)^{2,3}.

Plant-derived drugs form the backbone of Unani pharmacopeia, followed by drugs of animal and mineral origin^{2,3}. Numerous clinical studies have confirmed the therapeutic efficacy of Unani medicines with minimal adverse effects. In recent years, standardization, quality control, and toxicological profiling of many herbal drugs

have been carried out, and several formulations have been incorporated into the official *Unani Pharmacopoeia of India*.²

Psoralea corylifolia L. (Babchi) is a prominently used medicinal herb across Indian traditional systems, including Ayurveda, Unani, and Siddha. Native to Asia and Africa, the plant has been historically used to treat various dermatological disorders such as vitiligo, leucoderma, eczema, and leprosy^{4,5}.

Phytochemically, the plant is rich in bioactive constituents, particularly psoralen, bakuchiol, isopsoralen, angelicin, along with several flavonoids and coumarins^{6,7}. Among them, psoralen—a linear furanocoumarin—has been widely investigated for its photosensitizing effects and its role in PUVA (Psoralen + UVA) therapy for conditions like vitiligo and psoriasis⁸.

The seeds are the most commonly used part and demonstrate a broad spectrum of bioactivities including antimicrobial, anti-inflammatory, antioxidant, hepatoprotective, and estrogenic effects, making the plant a promising candidate for future drug development^{9,10}. However, despite its widespread traditional use, scientific validation, safety profiling, and standardization remain critical challenges due to variations in active constituents across geographical and processing conditions.

Thus, this review integrates insights from classical Unani texts and contemporary scientific research, highlighting the pharmacological relevance and therapeutic potential of *P. corylifolia*.

Materials and Methods

A comprehensive survey of classical Unani literature was undertaken to collect information on the temperament (*mizāj*), medicinal attributes, and therapeutic applications of *P. corylifolia*. Primary sources included authoritative Unani texts, such as:

- *Al-Jāmi‘ al-Mufradāt al-Adwiya wa’l-Aghziya* by Ibn al-Baitar (1197–1248 AD)
- *Muḥīt-e-A‘zam* by Ḥakīm Muḥammad A‘zam Khān (1806–1902 AD)

- *Khazā’in al-Adwiya* by Najm al-Ghani (19th century)
- *Al-Mukhtārāt fī al-Ṭibb* by Ibn Hubal Baghdādī (1122–1213 AD)
- *Tazkira Ūlū al-Albāb* by Dāwūd al-Antākī (1541–1599 AD)
- *Tuhfat al-Mu‘minīn* by Ḥakīm Mu‘min Tūnkabūnī (1669 AD)

Where needed, authentic Urdu and Persian translations of these classical texts were referred to. Additionally, scientific databases including PubMed, Science Direct, and Google Scholar were searched for peer-reviewed research articles related to the Phytochemistry and pharmacological activities of *P. corylifolia*. Relevant studies were selected based on keywords such as “*Psoralea corylifolia*, Phytochemistry, pharmacology, Unani medicine and vitiligo, coumarins, bakuchiol, and PUVA therapy.”

The Unani technical terminology used in this review was standardized using the official publication *Standard Unani Medical Terminology* by the Central Council for Research in Unani Medicine (CCRUM) in collaboration with the World Health Organization.

Description of *Psoralea corylifolia* (Babchi) in Unani Literature

Table 1: Alternative name in different languages.

Language/ Region	Common name
Arabic	Bābchī ^{11,12} .
Persian	Bābchi ¹¹
Bengali	Hakuchi, Bavachi, Lata Kasturi ^{12,13}
English	Babchi, Babchi seeds ¹¹
Gujarati	Bavacha, Babchi, Bawachi, Bakchi, Bhavaj ¹⁴
Kannada	Bauchige, Bhavanti buja, Bhavanchigid, Baukuchi ¹⁵
Kashmiri	Babchi ¹⁴
Malayalam	Karkokil, Karpokhari, Kamkoalan ¹⁶
Sanskrit	Somaraji, Bakuchi, Sugandha Kantak ^{13,11,14}
Tamil	Karpokarishi, Karpurarishi, Karporgam ¹¹
Telugu	Bavanchalu., Bhavanji, Karubogi, Bapurlen, Baranchalu ¹⁵
Urdu	Babchi ^{11,12,13}

Parts Used (A‘zā-i-Musta‘malah)

The parts of *P. corylifolia* used in Unani medicine include leaves, flowers, seeds, roots, and fruits^{17,18,20,21}.

Temperament (Mizāj)

In Unani medicine, the concept of temperament (*mizāj*) is foundational to drug classification and action. Drugs are categorized by their qualitative attributes—hot, cold, moist, or dry—based on their physiological effects. The

temperament of Babchi is classified as hot in the second degree and dry in the second degree (*Hār Yābis Darajah Sānī*)^{11,13,15,16,20,22}.

Detoxification (Tanqiya)

- Detoxification is recommended prior to therapeutic use of *Babchi*. According to Unani texts, seeds should be soaked in ginger water (*Āb-e-Adrak*) for seven

days, with daily renewal of the solvent to mitigate potential side effects¹⁵.

- In Hindi traditional practice, a more intense detoxification process involves soaking the seeds in the urine of an infertile red cow. The urine is replenished daily for 21 days. Once complete, the seed peel is removed, and the seeds are dried in the shade¹⁶.

Dose (*Miqdār-e-Khurāk*):

The recommended dosage for *Babchi* varies based on the formulation and intended use:

- **Powdered seeds (Sufoof):** 3.5–10.5 *māsha*¹¹, 3–5 *g*¹², 1–3 *māsha*¹⁵
- **Seed infusion (Zulāl):** 1.25 *tola*^{11,16}

Mode of Administration (*Tarkīb-e-Istīmālāt*):

Babchi is administered both orally and topically. Oral preparations include powders and infusions, while

external applications include paste (*Zamād*) and ointment (*Marham*)^{11,18}.

Adverse Effects (*Muzirrāt*):

Unani texts mention certain adverse effects associated with *Babchi*, including aggravation of bile and potential induction of tuberculosis and flatulence (*Naffākh*)^{11,15}.

Correctives (*Muṣliḥāt*):

To mitigate adverse effects, correctives such as *Sikanjabin*, curds, and oil-based preparations (*Raughaniyāt*) are traditionally co-administered^{11,12,15}.

Substitute (*Badal*):

In case of unavailability, *Tukhm-e-Panwar* is recommended as a suitable substitute for *Babchi*^{11,12,15}.

Pharmacological Actions (*Afāl*):

Psoralea corylifolia is documented with a broad range of pharmacological actions in Unani medicine (Table 2).

Table 2. Documented pharmacological actions of *P. corylifolia* in Unani literature

Action (Afāl)	Action (Afāl)
<i>Muṣaffī-i-Dam</i> (Blood purifier) ^{11,15}	<i>Kasir-e-Riyāḥ</i> (Carminative) ¹⁹
<i>Muḥammir-i-Jild</i> (Rubefacient) ¹³	<i>Mushtahī</i> (Appetizer) ²²
<i>Muqawwī-i-Midah</i> (Gastric tonic)	<i>Dāfi'-e-Waja'-i-Midah</i> (Anti-stomach ache) ²³
<i>Qātil-i-Dīdān</i> (Anthelmintic) ¹⁹	<i>Dāfi'-e-Tap-e-Balghamī</i> (Anti-phlegmatic fever) ¹⁸
<i>Mulayyin-i-Am'ā</i> (Laxative) ^{15,16}	<i>Mu'arriq wa Mudirr-i-Baul</i> (Diaphoretic & Diuretic) ¹¹
<i>Dāfi'-e-Bars</i> (Anti-leucoderma)	<i>Muḥallil-i-Waram</i> (Anti-inflammatory) ¹⁵
<i>Jalī</i> (Detergent) ¹¹	<i>Muḥarrrik wa Muqawwī-i-Bāḥ</i> (Stimulant & Aphrodisiac) ¹⁶
<i>Muqawwī-i-Qalb</i> (Cardiotonic) ¹⁵	<i>Mushil</i> (Purgative) ^{11,13}
<i>Dāfi'-e-Damā</i> (Anti-asthmatic) ^{11,13}	<i>Musakkin</i> (Sedative) ¹⁴
<i>Māni'-e-Jarāthīm</i> (Antibacterial) ¹¹	

Principal Action (*Fi'l-e-Khāṣ*)

The most emphasized property of *Babchi* is *Muṣaffī-i-Dam* (Blood purifier), making it particularly valuable in treating chronic dermatological and blood-related disorders^{11,12,15,16}.

Therapeutic Uses in Unani Medicine

In classical Unani texts, *Babchi* seeds are indicated for a wide range of diseases, particularly skin disorders including:

1. *Bars* (Leucoderma)¹¹
2. *Bahaq* (Pityriasis)^{11,12}
3. *Da'us Sadaf* (Psoriasis)^{11,15}
4. *Juzām* (Leprosy)¹⁶
5. *Jarab* (Scabies)²⁴

6. *Hikkah* (Pruritus)^{12,15}
7. *Qūba* (Ringworm)^{24,25}
8. *Fasād-e-Khūn* (Blood Impurities)^{11,12,25}

Other documented indications include:

9. *Amrāz-e-Dam* (Blood disorders)¹³
10. *Amrāz-e-Ṣafrā* (Bilious conditions)¹⁶
11. *Tap-e-Balghamīya* (Phlegmatic fever)¹⁹
12. *Dīdān-i-Am'ā* (Intestinal worms)²⁴
13. *Qarḥa-i-'Aṭshak* (Syphilitic ulcers)^{13,19}
14. *Sur'at al-Inzāl* (Premature ejaculation)^{13,16}

Major Therapeutic Effect

Among its diverse applications, *Babchi* is most valued for its anti-leucodermal and anti-pityriatic effects¹⁵.

Unani Formulations of *Babchi* (*Psoralea corylifolia* Linn.):

Table 3: Showing compound formulations of *Babchi*, dosage and indications

Formulation Name (Dosage Form)	Dosage and Method of Administration	Indications
<i>Sufoof-e-Bars</i> (Powder) ²⁶	5 g orally with water	<i>Bars</i> (Leucoderma), <i>Bahaq</i> (Pityriasis), <i>Daussadaf</i> (Psoriasis), <i>Juzam</i> (Leprosy)
<i>Zimad-e-Bars</i> (Paste) ²⁷	Applied topically	<i>Bars</i> (Leucoderma), <i>Bahaq</i> (Pityriasis)
<i>Raughan-e-Babchi</i> (Oil) ²⁶	Applied topically	<i>Jarab</i> (Scabies), <i>Hikkah</i> (Pruritus), <i>Quba</i> (Ringworm)
<i>Habb-e-Bars</i> (Tablet) ²⁸	Mixed with water and applied as a paste	<i>Bars</i> (Leucoderma), <i>Juzam</i> (Leprosy)
<i>Habb-e-Hindi</i> (Tablet) ^{26,27}	Two tablets orally, twice daily	<i>Bahaq</i> (Pityriasis), <i>Daussadaf</i> (Psoriasis), <i>Juzam</i> (Leprosy)

Botanical and Scientific Description of *Babchi* (*Psoralea corylifolia* Linn.)

Plant Description:

Psoralea corylifolia is an erect, herbaceous annual, or occasionally a short-lived perennial, growing between 50–120 cm in height. The seeds are small, kidney-shaped, smooth, and dark brown to black in colour, characterized by a distinct aromatic odour and a bitter taste. The seeds

are embedded in a resinous coating, which is believed to contribute to their pharmacological properties⁵⁵.

Geographical Distribution

Species of *Psoralea* are native to the Americas, particularly prevalent in southern regions and the Allegheny range³⁰. In India, the plant is distributed across various states, including Uttar Pradesh, West Bengal, and Maharashtra¹².

Table 4: Taxonomical classification:

Kingdom	<i>plantae</i>
Division	Angiospermae
Class	Dicotyledoneae
Order	Rosales
Family	Leguminosae
Sub Family	Papilionaceae
Genus	<i>Psoraleae</i>
Species	<i>Corylifolia</i> Linn ²⁹



Figure 1: *Babchi Psoraliya Corylifoliya* L.(seeds)

Morphology (Botanical description)

Table 5: Organoleptic Characters of *Babchi* Seeds^{31,32,33}

Parameter	Description
Appearance	Small, oval to kidney-shaped seeds; slightly flattened
Color	Dark brown to blackish
Odor	Distinct, characteristic, slightly aromatic or pungent

Taste	Bitter and slightly acrid
Texture	Smooth, hard, and somewhat oily to touch

(A) Macroscopic:

Plant parts	Morphological characteristic
Plant	an erect, 0.3-1.8 m. high annual herb
Leaves	broadly elliptical and dentate
Flowers	yellow or bluish purple in dense axillary long peduncled heads
Seeds	Dark chocolate to almost black. The fruit (seed) consists of a sticky oily pericarp; a hard seed coat and kernel ^{12,30} .

(b) Microscopic:

Transverse section of fruit shows pericarp with prominent ridges and depressions, consisting of collapsed parenchyma and large secretory glands containing oleo-resinous matter; testa, an outer layer for palisade epidermis, layer of bearer cells which are much thickened in the inner tangential and basal radial walls and 2-3 layers of parenchyma; cotyledons of polyhedral parenchyma and three layers of palisade cells on the adaxial side¹².

The fruit of *Psoralea* is perennial. The fruit cannot survive in freezing weather. The arrangement of the leaves is racemes. The simple leaves are broad, elliptic, having margins with dents. The color of the flowers when it blooms during rain are purple with blue tints¹³. The crop gets fully mature in 7–8 months. The seeds take time to mature, and therefore collection can be rendered 4–5 times from December to March³⁴.

Phytochemistry:

The seeds of *Psoralea corylifolia* contain a wide array of phytoconstituents, including an essential oil (0.05%), a non-volatile terpenoid oil, a dark brown resin (8.6%), a brown fixed oil (10%), and a pigment identified as hydroxyflavone. Additionally, the seeds yield a monoterpenoid phenol known as bakuchiol, as well as raffinose and various coumarin compounds such as psoralidin, psoralen, isopsoralidin, isopsoralen, and corylifolin. Other constituents include albumin, sugar, 7.5% ash content, and traces of manganese^{18,19,20,35}.

Among the therapeutically active components, psoralen and isopsoralen have been particularly noted¹³. Upon storage, the fixed oil deposits psoralen, which contains approximately 21.5% resin acid. The unsaponifiable fraction of the oil contains stigmaterol. Both the essential oil and unsaponified oil exhibit pharmacological activity and are utilized in the treatment of dermatological conditions, particularly leucoderma and psoriasis^{20,35}.

Biological and Pharmacological Activities**Antibacterial Activity:**

The antibacterial potential of *P. corylifolia* has been demonstrated against a broad spectrum of pathogens⁴⁸. Seed extracts rich in bakuchiol inhibit *Staphylococcus aureus* (including methicillin-resistant and β -lactamase-

producing strains), *Streptococcus mutans*, and *Actinomyces viscosus*. Psoralidin and bakuchicin show efficacy against *Shigella sonnei* and *Shigella flexneri*, while psoralen and angelicin inhibit *S. aureus*. Bakuchi-based formulations (ointments, oils, and mouth rinses) have shown inhibitory effects against *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae*, and *S. aureus*. Bakuchi mouth rinses suppress *S. mutans* at low concentrations and impact human gingival fibroblasts.

Antifungal Activity:

Bakuchiol, a phenolic compound extracted from the seeds, exhibits strong antifungal activity against several pathogenic strains including *Microsporum gypseum*, *Epidermophyton floccosum*, *Trichophyton rubrum*, and *T. mentagrophytes* at approximately 250 $\mu\text{g/ml}$ ⁴⁹.

Antiviral Activity:

The crude ethanol extract of *P. corylifolia* seeds exhibits potent antiviral activity against the papain-like protease (PLpro) of SARS-CoV, with an IC_{50} value of 15 $\mu\text{g/ml}$. This protease is essential for the replication of the SARS virus⁴¹.

Antiprotozoal Activity:

The methanolic extract of *P. corylifolia* exhibited marked efficacy against the external protozoan parasite *Ichthyophthirius multifiliis* in freshwater fish. At 5.00 mg/L, the extract resulted in 100% mortality of protomonts and 88.9% of encysted tomonts⁵³.

Anthelmintic Activity:

Clinical evaluations have confirmed the anti-helminthic properties of *P. corylifolia* seeds against both roundworms and flatworms⁵⁰.

Anti-leucoderma Activity:

Psoralen, a key compound isolated from *P. corylifolia*, induces melanogenesis and has been employed effectively in the treatment of leucoderma³⁷.

Anti-psoriatic Activity:

The plant has demonstrated therapeutic benefit in the management of psoriasis³⁸.

Anti-inflammatory Activity:

The chloroform extract of the seeds, at a dose of 400 mg/kg, exhibited significant activity in models of

carrageenan-induced paw edema in rats and mouse ear inflammation³⁹. Three isoflavone derivatives—7-O-methylcorylifol A, 7-O-isoprenylcorylifol A, and 7-O-isoprenylneobavaisoflavone—were isolated from the fruits and shown to possess anti-inflammatory effects⁴⁰. Neobavaisoflavone, a flavonoid found in the plant, significantly inhibited ROS and RNS production, and the expression of cytokines (IL-1 β , IL-6, IL-12p40, IL-12p70, TNF- α) in LPS+IFN- γ or PMA-stimulated RAW264.7 macrophages⁴¹.

Antioxidant Activity:

Tannins and flavonoids in *P. corylifolia* act as natural antioxidants, helping prevent β -cell damage and oxidative stress in diabetes³⁸.

Anti-acne Activity:

Bakuchiol and other phenolic compounds in the plant exhibit anti-acne activity. Bakuchiol has been shown to be safe, non-irritating, and non-sensitizing, making it suitable for prolonged application⁴³.

Anti-eczema Activity:

In an open-label clinical study, a cream formulated from hexane-extracted seed oil showed promising results in 30 patients with eczema over 30 days⁴⁴.

Anticancer Activity:

Leaves of *P. corylifolia* contain more than 2 g/kg of genistein. Furocoumarins such as psoralen and isopsoralen induced apoptosis in carcinoma cell lines KB, KBv200, K562, and K562/ADM, with IC₅₀ values for isopsoralen at 61.9–72.0 μ g/ml and psoralen at 24.4–88.1 μ g/ml⁴⁵. Bakuchiol demonstrated selective apoptosis in hepatic stellate cells, indicating potential against liver cancer^{46,47}.

Hepatoprotective Activity:

In Hep G2 cells, bakuchiol and related compounds exhibited hepatoprotective effects against tacrine-induced cytotoxicity⁵¹.

Anti-diabetic Activity:

Aqueous seed extract improved fasting glucose levels, antioxidant enzyme activities (catalase, peroxidase, SOD), and reduced lipid peroxidation in streptozotocin-induced diabetic rats at a dose of 20 mg/0.5 ml/100 g body weight⁵².

Immunomodulatory Activity:

The seed extract of *P. corylifolia* enhanced natural killer (NK) cell activity and modulated antibody-dependent cellular cytotoxicity in murine models⁵⁴.

Discussion:

Babchi (*Psoralea corylifolia*) is regarded as a valuable medicinal plant in Unani medicine, possessing multiple pharmacological actions such as antioxidant, anti-dermatotic, and anti-inflammatory effects. Both the crude drug and its active constituents have been extensively investigated for their therapeutic potential across various disease conditions. Numerous compound

formulations containing Babchi are currently available in the market for clinical use.

The primary action of Babchi on the skin is attributed to its bitter taste and pungent post-digestive effect, which help pacify the *Safra* and *Balghami* humours. It also plays a significant role in *Tazkiyah-e-Dam* (blood purification), making it effective in the treatment of dermatological disorders.

Conclusion:

P. corylifolia, commonly known as Babchi, is a distinguished medicinal drug recognized since antiquity, with references found across multiple traditional systems of medicine. In the Unani tradition, its properties (*Mizaj*, *Af'al*) and therapeutic applications have been extensively described in classical treatises. Unani scholars also acknowledge its potent action, particularly in dermatological ailments. Over seventy phytoconstituents have been identified from various parts of the plant, many of which possess notable pharmacological activities.

Babchi is revered as a classical remedy for cutaneous disorders and has been traditionally indicated in conditions such as Bars (leukoderma), *Bahq* (vitiligo), *Juz'am* (leprosy), and other chronic skin ailments. In recent decades, modern pharmacological studies have further validated its therapeutic actions, including anti-inflammatory, antioxidant, and immunomodulatory properties. Several Unani formulations containing Babchi are commercially available, such as *Roghan Babchi*, *Sufoof-e-eBabchi*, *Zimad-e-Bars* and *Habb-e-Bars*, are utilized in the management of various diseases.

This review comprehensively highlights the Ethnomedicinal significance, phytochemical constituents, and pharmacological profile of *P. corylifolia*, underscoring its value as a classical drug with modern therapeutic relevance.

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