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Babchi (*Psoralea corylifolia* Linn.): An effective Unani medicine for dermatological disorders: A review

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Abstract
Unani Medicine believes in humoral and temperamental theory and on the basis of these two theories the disease is diagnosed and treatment is prescribed accordingly. Babchi (*Psoralea corylifolia* Linn.) is one of the famous Unani Medicines mentioned in classical Unani literature for the effective treatment of Leucoderma, Psoriasis, Leprosy and other skin disorders. Its main functions are Musaffi-e-khoon, Daf-e-Bars, Daf-e-Juzam, Daf-e-Daussadaf, Daf-e-Kharish, Jali and Mulayyen etc. Because this medicine is already being used in different dosage forms, the aim of this article is to highlight the use of this herbal medicine in Leucoderma and also explore its efficacy in different diseases that could be beneficial for the masses.

Keywords: Babchi, *Psoralea corylifolia*, leucoderma, psoriasis, leprosy, skin disorders

Introduction
Babchi (*Psoralea corylifolia* Linn.) is well known drug described in Unani Pharmacopoeia. It belongs to the family Leguminosae [1]. Its seeds are used as medicine. According to classical unani books it has been effectively used in Leucoderma, Melasma, Pruritus, Leprosy, blood impurities [2]. The plants of Psoralea had been given high value due to the medicinal properties they showed. The word Psoralea originates from the Greek psoraleos, which stands for "affected with the itch or with leprosy" [3]. The species of Psoralea are native to America, commonly found in the South and the Alleghenies in the west [4], distributed throughout India, found commonly in Uttar Pradesh, Bengal and Maharashtra[1]. *P. corylifolia* grows annually and is an erect herb. The range of height to which this plant grows is between 30 and 180 cm, it does not grow in shade and requires warm location. The soil requirement for this plant is clay, sand, and loam types. The plant can survive in acid, basic, and neutral environment. The best sowing season for this plant is March to April. Seeds get mature in November. The plant may grow up to 5–7 years if proper care is given [1, 5].

Mutradifat (Vernacular Names) [1, 6]
Arabic: Babchi
Persian: Babchi
Bengali: Hakuchi, Bavachi, Lata Kasturi
English: Babachi, Babchi seeds
Gujarati: Bavacha, Babchi, Bawachi, Bakchi, Bhavaj
Kannada: Bauchige, Bhavanti buja, Bhavanchigid, Baukuchi, Baranchigida, Karbekhiya
Marathi: Babachi, Babchi, Bavachi
Sanskrit: Somaraji, Bakuchi, Sugandha Kantak
Tamil: Karpokarishi, Karpurarishi, Karporgam
Telegu: Bavanchalu, Bhavanji, Karubogi, Baaranchalu, Bapurlen, Baranchalu
Urdu: Babchi

Classification [7]
The plant classification details are:
Kingdom: Plantae
Division: Angiospermae
Class: Dicotyledoneae
Order: Rosales

Family: Leguminosae
Subfamily: Papilionaceae
Genus: Psoralea
Species: *Corylifolia* Linn

Description

a) Macroscopic: Fruits, dark chocolate to almost black with pericarp adhering to the seed-coat,3- 4.5mm long, 2-3 mm broad, ovoid-oblong or bean shaped, somewhat compressed, glabrous rounded or mucronate, closely pitted; seeds campylotropous, non-endospermous, oily and free from starch; The fruit normally has no odor, but when chewed, it produces pungency. The taste of the fruit is bitter, acrid, and unpleasant. The size of the flowers are small and shaped like red clover [1, 8].

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 side [1].

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 tints [8]. 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 March [9].

Fig 1: The fruit of Psoralea is perennial

Identity, Purity & Strength [1]

Foreign matter: Not more than 2 per cent Total ash: Not more than 8 per cent Acid-insoluble ash: Not more than 2 per cent Alcohol-soluble extractive: Not less than 13 per cent Water-soluble extractive: Not less than 11 per cent.

Important Formulation [1]

Sufoof-e-Bars

Chemical constituents of the plants

The seeds contain an essential oil (0.05%), a nonvolatile terpenoid oil, a dark brown resin (8.6%), and traces of alkaloidal substance. Dymock stated that the seeds contain 13.2% of extractive matter, albumin, sugar, ash 7.4%, and traces of manganese [10, 11]. P. corylifolia extract contains a number of chemical compounds including flavonoids (neobavaisoflavone, isobavachalcone, bavachalcone, bavachinin, bavachin, corylin, corylifol, corylifolin and 6-prenylnaringenin), coumarins (psoralidin, psoralen, isopsoralen and angelicin) and meroterpenes (bakuchiol and 3-hydroxybakuchiol) [12]. Many studies have confirmed that plants and foods rich in polyphenolic content are effective scavengers of free radicals, thus helping in the prevention of these diseases through their antioxidant activity [13].

Temperament (Mizaj)

Hot 2^0 and Dry 2^0 [2, 6, 14]
Hot 3^0 and Dry 3^0 [2, 15, 16]

Therapeutic Dosage (Miqdar-e-Khurak)

Seeds powder (Safoof): 3.5-10.5 Masha [2], 4-6 Gm [17, 18], 3 to 5 Gm [1]

Seeds infusion (Zulal): 1.25 Tola [2, 16]

Method of Uses (Tarkeeb-e-Istemalat)

Babchi seeds are prescribed both for oral administration and for external topical application in the form of a paste (Zamad) and ointment (Marham) [2, 19].

Pharmacological Actions (Af'aal)

Musaffi-e-Khoon (Blood Purifier) [1, 2, 6, 14-17, 19, 22], Daf-e-Bars (Anti-Leucoderma) [2, 6, 14-17, 22], Daf-e-Juzam (Anti-leprosy) [2, 17, 18, 20], Daf-e-Kharish (Anti-pruritic) [2, 16, 18], Daf-e-Daussadaf (Anti-psoriatic) [10, 17, 21], Jali (Detergent) [2, 14, 15], Mulayyen-e-Am'aa (Laxative) [14, 15, 16, 17, 18], Kasir-e-Riyah (Carminative) [6, 14, 15, 16], Mushtahi (Appetizer) [2, 16, 18], Muqavvi-e-Medah (Gastric tonic) [6, 14, 16], Daf-e-Waja-e-Meda (Anti-stomacache) [18, 23], Qatil-e-Deedan-e-Amaa (Anthelmintic) [2, 6, 10, 14, 15], Daf-e-Tap-e-Balghamiya (Anti-phlegmetic Fever) [2, 15, 16, 17], Mu'arriq wa Mudirr-e-Baul (Diaphoretic and Diuretic) [10, 17, 19], Muhallil-e-Waram (Anti-inflammatory) [2, 16, 23], Muharrik wa Muqavvi-e-Bah (Stimulant and Aphrodiasiac) [15, 17, 18, 20, 23], Muqavvi-e-Qalb (Cardiac Tonic) [2, 16, 18], Mushil (Purgative) [18, 23], Dafe-e-Damah (Anti-asthmatic) [2,16,18], Musakkin (Sedative) [17, 23], Maney-e-Jarasim (Antibacterial) [10, 19, 23].

Therapeutic Uses (Mahal-e-Istemalat)

Babchi seeds are useful in the treatment of many diseases such as Bars (Leucoderma), Bahaq (Pityriasis), Daussadaf (Psoriasis), Juzam (Leprosy), Jarab (Scabies), Hekah (Pruritis), Quba (Ring worm) and Fasad-e-Khoon (Blood Impurities) [1, 2, 6, 10, 14-18-14]. They are also used in Amraz-e-

Dam (Blood Diseases), Amraz-e-Safra (Bilious Diseases) Tap-e-Balghamiya (Phlegmatic Fever), Deedan-e-Am'aa (Intestinal worms), Qarha-e-Atshak (Syphilitic Ulcer), and Surat-e-Inzal (Premature Ejaculation) [6, 16, 17, 18].

Pharmacological Properties

Anti-leucoderma activity

P. corylifolia proved a promising anti-leucoderma agent. One of the bioactive isolated compound "soralen" found to have the ability to stimulate the development of melanin, and therefore it is employed for Leucoderma treatment [24].

Anti-acne activity

It is reliable anti-acne agent. It is used in anti-acne formulations due to the presence of phenolic compounds Bakuchiol. It proved to be safe and non-irritant and can be used for longer periods of the day because it showed no irritation and is non-sensitized [25].

Anti-psoriatic activity

The plant is also used against the skin disease known as psoriasis [26].

Anti-eczema activity

In one experiment, seeds of *P. corylifolia* was extracted with hexane and oil in water, cream was prepared with stearic acid as a base. In the next step, an open clinical trial was conducted on 30 patients suffering from eczema for a period of 30 days. This study concluded that this plant could be effectively used for the treatment of eczema [46].

Antibacterial activity

P. corylifolia has been tested for antibacterial activity [28].

Antifungal

A phenolic compound bakuchiol extracted from *P. corylifolia* (seeds) exhibited antifungal activity against many strains of pathogenic fungi, including *Microsporum gypseum*, *Epidermophyton floccosum*, *Trichophyton rubrum*, and *Trichophyton mentagrophytes* in a dose range of about 250 µg/ml [29].

Antiviral activity

The crude ethanol extract of the seeds of *P. corylifolia* was revealed to have high activity against the severe acute respiratory syndrome corona virus (SARS-CoV) papain-like protease (PLpro) with an IC_{50} of value of 15 µg/ml. SARS-CoV-PLpro is a main enzyme that have a vital role in SARS virus replication [30].

Antioxidant activity

Which are present in plants, herbs and dietary sources help in preventing vascular diseases in diabetic patients [31]. Tannins and flavonoids are the secondary metabolites in plants considered to be the natural source of antioxidants which prevent destruction of β-cells and diabetes-induced ROS formation [32].

Anthelmintic activity

The anti-worm property of the seeds of *P. corylifolia* is clinically proven on roundworms and flatworms [46].

Antiprotozoal activity

Ichthyophthirius multifiliis (also called "ich") is an external protozoan parasite has been reported to infest freshwater fish species. The *P. corylifolia* extracted with methanol showed excellent activity against *I. multifiliis* theronts in concentration of 1.25 mg/L or more when was exposed for a period of 4 hr. The *P. corylifolia* extract at 5.00 mg/L concentration has caused 100% mortality of protomonts and 88.9% of encysted tomonts [33].

Insecticidal and genotoxic activity

Volatile oil extracted from the seeds of *P. corylifolia* displayed strong toxicity against both larvae and adult of the southern house mosquito, *Culex quinquefasciatus* (earlier known as Culex fatigans) [34].

Protective Effect

The compounds from *P. corylifolia* were found to have a protective effect when tested against retinal damage caused by oxidative stress [35].

Anti-Alzheimer

Two compounds isolated from commonly used in clinical practices of Traditional Chinese Medicine *P. corylifolia* named as IBC and BCN modulate amyloid β (Aβ) peptides, especially the peptides with 40 (Aβ40) or 42 (Aβ42) residues, which are believed to be responsible for the development of amyloid plaques in Alzheimer's disease. The peptides were prepared in the lab in dried form in DMSO; Aβ42 5 mg/ml was used and was diluted in PBS to 50 µM. Both the compounds acted in a different way. IBC significantly inhibits both oligomerization and fibrillarization of Aβ42, whereas BCN converts Aβ42 into large unstructured aggregates in neuroblastoma cells. Both compounds were quite effective in Alzheimer's [36].

Antidepressant activity

P. corylifoia also found to possess antidepressant activity. Marzieh Sarbandi Farahani and colleague mentioned the mechanism of action of the plants with antidepressant action and the chemical components isolated from them. They mentioned that psoralidin isolated from seeds of *P. corylifolia* modify the hypothalamic–pituitary–adrenal axis [37].

Anti-diabetic activity

A more detailed biochemical study was conducted on the aqueous extract of seed of *P. corylifolia* that caused a significant recovery in the activities of hexokinase, glucose-6-phosphatase, and glucose-6-phosphate dehydrogenase and antioxidant enzymes such as peroxidase, catalase, and superoxide dismutase, along with the lipid peroxidation level in liver tissue and serum transaminase, and corrected the fasting blood glucose level in streptozotocin-induced diabetic rats at a dose of 20 mg/0.5 ml water/100gm body weight [38].

Neuroprotective

P. corylifolia has been the part of many ayurvedic formulation that are used for the treatment of various central nervous system conditions such as for neurotropic activity and as central nervous system protective agent [39]. Based on such report, a study was conducted on the extract *P. corylifolia* L. seeds. The results displayed a significant protective effect against 3-nitropropionic acid (3-NP) induced cytotoxicity. This study showed that *P. corylifolia*

mseed extracts may have potential usefulness as therapeutic agents against neurodegenerative diseases [40].

Anti-obesity

Various studies on animals showed that genistein has the ability to decrease body weight by decreasing food intake. It also reduced the fat pad weight and enhanced the apoptosis of adipose tissues. For example, one such study was conducted on ovariectomised mice. This well-known trihydroxyflavone, Genistein, has also been isolated from *P. corylifolia*, exhibited a potential anti-obesity and obesity related low grade inflammation activities through multiple mechanisms and cell signaling pathways. *P. corylifolia* extract possesses anti-obesity and ant-diabetic activity by its action on adipocyte life cycle, obesity-related low-grade inflammation, and oxidative stress [41].

Effect on osteoblast

The well-known Chinese herb *P. corylifolia* L. (Scurfpea fruit) has been employed for the treatment of bone fractures and also for joint diseases for thousands of years. *P. corylifolia* also improved the pathological bone condition, Hyperosteoidosis, by increasing the serum inorganic phosphate level at a dose of 30 mg/kg. It was observed previously that the extract markedly decreased osteoid volume and there has been improvement in bone calcification [42]. An advanced herbal formula containing Psoraleae Fructus has previously showed promising bone protecting effect when tested in rats, and later on showed excellent results in women with osteoporosis. This herbal formula could efficiently have promoted the osteogenesis and suppress the adipogenesis in mesenchymal stem cells [43].

Immunomodulatory activity

The extract of seeds of *P. corylifolia* have been reported to have stimulant activity against natural killer cells when tested in mice. This study report that the extract also modulates the antibody dependent cellular toxicity [44].

Anticancer activity

The isolated compounds from *P. corylifolia* including arylcoumarin and psoracoumestan showed strong anticancer potential by strongly inhibiting enzyme system of MAPK/ERK kinase phosphorylation. The mechanism underlying was apoptosis. Other compounds, including corylifol C and xanthoangelol, has been proved to be a strong inhibitor of protein kinase (inhibitory concentration 50% values for epidermal growth factor receptor: 1.1 and 4.4×10^{-6} μg/ml, respectively [45].

Conclusion

The above-mentioned summary about *P. corylifolia* clearly showed that it is a very important plant from ethnobotanical, pharmacological, and chemical point of view. To date, more or less hundreds of compounds have been separated from *P. corylifolia*. We, here presented the latest version of scientific literature on *P. corylifolia*, including the research work carried out in the recent years. *P. corylifolia* contains a wide variety of chemical constituents belonging to various groups, including flavonoids, coumarins, and meroterpenes, which are more dominant. *P. corylifolia* Linn. is a fortified source of biologically active compounds, which gives the plant with great value for its use in pharmaceuticals and health care industry. As there are very few effective herbal drugs for leucoderma and babchi is one of them. So this medicine is very valuable in the treatment of leucoderma patients. Therefore, more and more studies are needed to explore and enhance its efficacy in leucoderma and other skin disorders.

Conflict of Interest

Authors declare that there is no conflict of interest.

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