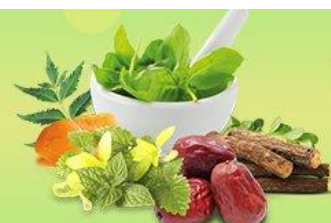


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Botanical Authenticity of Badranjboya: An Important Unani Drug

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Abstract

Badranjboya is an important Unani drug which is obtained from *Nepeta hindostana*, a herbaceous flowering annual or perennial plant of Lamiaceae family, distributed in India and Pakistan. It is well-known herbal drug for cardiac and mental diseases and texted in Arabic Unani literature as “*Mufarreh_al_Quloob*”, as mentioned by *Ibn Sina* (980-1037 AD) in his famous book “*Risala Advia Qalbiya*”. In Unani literature, a number of pharmacological effects of Badranjaboya are mentioned vz. tonic for vital organs, exhilarant, sedative, hypocholesteremic, anti-inflammatory, deobstruent and useful especially in the obstructions in the brain caused by imbalanced or increased black bile (*saoda*). Due to its sedative property, the drug is also used in allergic conditions such as asthma, its efficacy is also reported in insomnia, anxiety and depression. Many cardiac diseases are closely related with personal behavior and emotions attitude wherein Badranjboya produces promising results because of its efficacy in psychological disorders. Going through Unani and Ethnomedical texts, it was observed that there are great controversies with regards to its botanical identity. Some authors say that Badranjboya is obtained from *Melissa officinalis* whereas others state that it is derived from *Nepeta hindostana*. Keeping in view of its significant effect in cardiac and psychological disorders it is necessitated to confirm its botanical identity. Hence after consultation the Unani and ethnopharmacological literature the collection of genuine sample of Badranjboya was done. This paper is aimed to review the pharmacological details of Badranjboya in accordance with Unani and ethnobotanical literature as well as to resolve its botanical identity.

Keywords: Badranjboya, *Nepeta Hindostana*, *Mufarreh*, *Saoda*, Cardioprotective effect

Introduction

The genus *Nepeta* belongs to the family Lamiaceae and about 250 species of this genus are known. *Nepeta Hindustani* (Roth) Haines mainly consist of leaves also some time whole aerial part of the plant and is an important medicinal plant of the Indo- Pakistan subcontinent. In Indigenous System of Medicine particularly of Unani Medicine it is known as Badranjboya and is used to cure fever, sore throat and as cardiotoxic as well [1]. Its extract is reported to lower the blood cholesterol level in animals [2]. Leaves are also chewed to relieve toothache. Badranjboya is composed by two words “Badranj” and “Boya”. Badranj is known as Turanj in Unani whereas Boya means fragrance. The name “Badranjboya” has been coined due to its fragrance which is like that of citron (Badranj, Utruj or Turanj); it smells like Utruj so called Badranjboya [3].

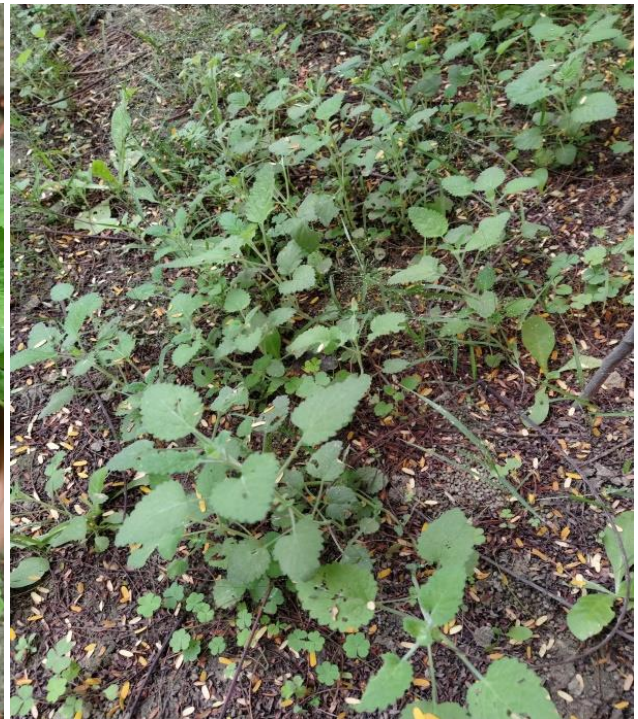


Fully matured plant of *Nepeta hindostana* with bluish purpule flowers collected from Forest Research Institute Dehradun (FRI)

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Taxonomical classification, Synonyms and Vernacular Names**Kingdom:** Plantae**Class:** Angiosperms**Order:** Lamiales**Family:** Lamiaceae**Genus:** *Nepeta***Species:** *Hindostana***Synonyms:** *Nepeta ruderalis* Buch.-Ham^[4], *Nepeta ruderalls*, *Melissa officinalis*^[3], *Glechoma erecta*, Spreng^[5], *Thymus nepetoides* Don^[5], *Glechoma hindostana* B. Heyne ex Roth^[6].**Vernacular Names**Arabic: Mufarreh-ul-Qalb, Habaq-ur-Rauhawi, Ward-ul-Qalb^[7].Persian: Badranjaboya, Badrangboya^[7]Urdu: Badranjboya and Billi Lotan^[8]English: Mountain Balm, Sweet or Lemun Balm^[8], Nepeta Herb^[9], Balm, Dropsy Plant, Honey Plant, Melissa, Sweet Balm, Sweet Mary^[10]Punjabi: Billilotan, Badranj boya^[4]Hindi: Billi Lotan^[11]Local: Fulwari, Dhaundua^[12]Immature plant of *N. Hindostana* grown at herbal garden department of Ilmu Advia Aligarh Muslim University**Habitat and distribution**

The plant is widely distributed in the regions of temperate Himalayas from Garhwal to Sikkim, Darjeeling to Khasi, Aka and Mishmi hills, at an altitude of 1200-3000 meters^[8]. Badranjboya is also found at Afghanistan^[13], Mediterranean Countries, Asia, Europe, and North America^[10], Foot of the Himalayas and Plains of North India^[5], Punjab, Upper Gangetic Plain, Bihar, West Bengal, Rajasthan, Deccan and Konkan^[4], Nepal Jhajra, Prem Nagar and Sahaspur^[14]. Commercial cultivation is centered in southwestern, central and Eastern Europe^[15].

As far as the geographical location of Badranjboya is concerned, many texts say that Badranjboya is abundant in Himalyan and Sub-Himalyan region, Sikkim, Jammu and Himachal Pradesh etc. and also found in wheat crop, but during the survey when the test drug was searched in the areas mentioned above, it caused a lot of problems and finding the exact plant became an uphill task. However, the fresh and original plant of Badranjboya (*Nepeta Hindostana*) was collected from Forest Research Institute

(FRI) Dehradun then from Shankar Nagar a village of district Balrampur Uttar Pradrsh and also cultivated at herbal garden of department of Ilmu Advia.

Mahiyat (Morphology and macroscopic features)

N Hindostana is an Ocimum like herbaceous plant^[3], annual, sub erect, slightly pubescent with middle size, velvety, 15-40 cm in height. Leaves petiole, ovate, obtuse, cremated, cordata at the base, pubescent on both sides, green or scarcely hairy, Racemes somewhat simple, Cymes dense, lower ones peduncled, Bracts subulate, outer ones equaling the calyx or a half shorter, branching from the base; branches are vertical or climbing, obtusely quadrangular, grooved, gently pubertal, almost floriferous throughout whole length. Mouth of the pubescent calyx oblique, teeth subulate, the upper ones longer, Corolla longer than the calyx, Nuts smooth or minutely granular, Flowers are purplish^[5]. Ascending or Erect herb. Leaves broadly ovate or orbicular, Flowers blue purple. Fruits are nutlets^[4]. Nutlets are brown with white spots^[13].



N. Hindostana whole plant, leaves, flower and seeds

Cultivation and Collection

Easily grown in average, dry to medium, well-drained soil in full sun to part shade. Prefers cool, moist soils. Plants are not as drought tolerant as many of the other Nepetas. In northern areas, plant grows in full sun. In the Deep South, grows in areas with some light afternoon shade. Plants may be cut back before first flowering to promote more compact size. Shear flower spikes after initial flowering to promote

continued bloom [16]. Flowering nearly all the year [5]. Leaves are harvested 2 to 3 times in a year at flowering stage. From one Hectare of land around 2000 kg of dried leaves can be obtained per year [17].

Part Used

Whole aerial parts [18] or dried leaves of *N Hindostana* are used [15].



A cat attracting towards broken leaves of *N. Hindostana*.

Temperament

Hot and Dry (1°) [1]

Hot and Dry (2°) [3]

Dose

5-7 g. is recommended. As brain tonic low dose (2-3g) is useful, for sedative effect 3-5 g and for heart diseases high dose (7-10 g). [1, 3, 8].

Adverse Effect

It is harmful for pulmonary diseases, [1, 3] reduces blood plasma level of phenytoin [19].

Correctives

Kundur (*Boswellia serrata* Roxb) and Samag Arabi (*Acacia arabica*) are used in the harm associated with *N. hindostana*. [1, 3].

Substitute Drugs

Aabresham (*Bombyx mori*) and Faranjamushk (*Ocimum gratissimum*) are an alternative of *N. hindostana* [1, 3].

Famous Compound Formulations

Badranjboya is used in various Khamirajat like Khamira Abresham Hakim Arshad Wala, Khamira Abresham Sheera Unnab Wala, Sharbat Ahmad Shahi, Majoon Seer Alwi Khan, Lipotab etc [4, 20, 21].

Pharmacological actions and Therapeutic Uses

The following actions have been described by different authors.

Mufarreh (Exhilarant), Muqawwi Qalb (Cardiotonic), Munzij (Concoctive), Musaffi dam (Blood Purifier), Muhallil (Resolvent), Musakkin (Calorific) [1, 3, 22, 23], Dafie Afsurdagi (Antidepressant), Dafii Tashannuj (Antispasmodic), Dafii Hikka (Antihistaminic), Qatil Verusiya (Anti-viral), Muaddil Khoon/Hormone (Blood alterative), Anti-thyroidal [24], Kasir Riyah (Carminative), Muqawwi (Tonic), Qabiz (Astringent), Muharrik (Stimulant) [13], CNS depressant, Musakkin (Sedative) [9], Dafe Iltehab (Anti-inflammatory) [4], Jaraseem Kush (Bactericidal) and Antifungal [15].

The decoction of fresh leaves or dried leaves powder of Badranjboya is used in phlegmatic diseases (*Amraz balghami*) and Melancholia (*Malankholiya*), epilepsy (*Sar'a*) hemiplegia (*Falij*) facial paralysis (*Laqwa*) and cardiac diseases (*Amraz Qalb*) [1, 25]. Dried leaves powder is useful in arthritis (*Wajaul Mafasil*) [24]. Its local application is beneficial in mastitis (*Warm Sadiyen*) [3, 24, 25, 26]. A decoction of the plant is used as a gargle for sore throat, halitosis (*Bakhrul Fam*) and mouth ulcers [3, 23, 24, 32]. *N. hindostana* is claimed to be useful in anxiety neurosis and nervous excitability, palpitation (*Khafqan*) and headache, also in hyperthyroidism and nervous sleeping disorder in the form of powder (*Safoof*), decoction (*Joshada*) and extract [22, 25, 26]. German Commission E recommended its uses in functional gastrointestinal complaints and externally for herpes labialis. The hot water extract exhibits antiviral properties, mainly due to rosmarinic acid and other polyphenoids [22]. Aqueous extract inhibits tumor cell dividing [22]. Dried leaves or whole herb when used with honey show its efficacy in hypochondriasis, migraine (shaqeeqa), hypertension, bronchial conditions, Graves' disease, attention deficit disorder, and Psychiatric conditions including depression and hysteria and parasitic disease [9, 10, 13, 27]. A syrup made with leaves of *N. hindostana* or leaves, seeds and other herbs and drinking it with honey and or water is efficacious in hypocholesteremia, various

cardiovascular complaints such as angina pectoris, cardiac thrombosis, tachycardia and weakness of the ear [4]. Smelling of this plant also gives same effect [4, 25]. According to British Herbal Pharmacopoeia, the plant is topically used for antiviral properties [22].

Chemical Constituents

Essential oil (0.05%) is found in the plant which contains Geranial (Citral A), Neral (Citral B), 6-methyl-5-hepten-2-one-Citronellal, Geranyl acetate, Beta caryophyllene oxide. The ratio of Geranial and Neral is 4:3.

Aerial part contains: Flavonoids (Cynaroside, cosmosiin, rhamnocitrin, Isoquercitrin), Glucosides, Caffeic acid derivatives, Triterpene acids, Polyphenols, Tannins [28]. Two new Triterpenes were isolated from *Nepeta hindostana*, they were named Nepeticin and Nepetidin [1]. Nepehinal a new triterpenoidal aldehyde was also isolated from the plant [9]. The main ingredient is citronellal (about 30-40%). The drug contains about 4% Rosmarinic acid (also known as labiate tannin) [15].

Tyler state that an active principle of the herb, Cis-Transnepetalactone produces stimulatory responses in cats when it is smelled, not when it is administrated internally but the Indian herb Badranjboya or billilotan does not attract cats nor their aroma stimulate them [28]. This statement is contrary to our observation found during drying process of Badranjboya collected at Shankar Nagar village of Balrampur District of Uttar Pradesh, India, because the cat showed euphoric action when smelled the fresh plant and became hyperactive, started rolling around the plant, flipping over it and sniffing, then licking and chewing with head shaking, cheek rubbing and then over rolling of head and rubbing its body with charming and fascinating style. This attraction of cat towards the Badranjboya mainly exhibits due to the presence of a constituent "Nepetolactone" that binds to the olfactory receptors of cats, typically resulting in temporary euphoria [29].

Some Pharmacological Studies**Cardioprotective and antioxidant studies**

Ahmad *et al.*, (2004) [30] screened out the cardioprotective effect of Hydroalcoholic extract of *N. hindostana* on Wistar albino rats against Isoproterenol induced acute myocardial infraction and found its promising role to prevent acute myocardial infraction.

Devi *et al.*, (2017) [31] evaluated the lipid lowering effect of *N. hindostana* on rats with both aqueous and methanolic extract against intraperitoneal injection of triton WR 1339 (400 mg/kg) for acute study and feeding high cholesterol diet for sub-acute study. They found that lipid levels were significantly attenuated by different doses of aqueous and methanolic extract, but the methanolic extract (400 mg/kg) has lowest atherogenic index and maximum protection in triton and cholesterol diet induced dyslipidemia. This study claims that this lipid lowering effect may be due to the presence of antioxidant constituents in the plant.

A clinical study was done by Azhar *et al.*, (2017) [32] on 30 patients having risk of atherosclerosis. The patients were treated with 6 gram powder twice a day for two months. The response was evaluated by the assessment of subjective parameters (palpitation, breathlessness, headache and chest pain) and objective parameters (blood pressure, lipid profile, hematocrit value and random blood sugar). The result

showed significant reduction in both subjective as well as objective parameters.

Kainsa *et al.*, (2015) [33] evaluated the antihyperglycemic and antioxidant properties of aqueous and methanolic extracts of the whole herb of *Nepeta hindostana* in alloxan and OGTT induced diabetes in rats. They found that treatment of NHA and NHM extracts (100, 200 and 400 mg/kg) for 7 days significantly attenuated the serum glucose level and protected against hyperglycemic and alloxan-induced oxidative stress in experimental animal models. This study suggests that its hypolipidemic effect could represent a protective mechanism against the development of atherosclerosis.

Antimicrobial activity

Amreen *et al.*, (2019) [34] studied the antioxidant and antimicrobial activity of essential oils of leaf, stem, flower and aerial part of *Nepeta hindostana* against four Gram-negative and five Gram-positive pathogenic strains. The essential oil from flower showed potent activity (37.5 µg/ml) against *S. aureus* and *S. mutans* but was less active against Gram-negative bacterial strains. In anti-MRSA activity, leaves and flowers exhibited strong activity against *S. aureus* (SA-2071) and *S. aureus* (SA-4627).

Antiplatelet activity

Vaseem *et al.*, (2016) [35] studied antiplatelet activity of ethanolic and aqueous extract of *N. hindostana* at different concentrations using platelet rich plasma (PRP) prepared by centrifugation of rabbit whole blood. *N. hindostana* showed very excellent antiplatelet activity in both aqueous and alcoholic extracts. This study showed that *N. hindostana* could produce promising result for the treatment of blood clot and pulmonary embolism related diseases.

Anti-inflammatory activity

The plant also shows significant anti-inflammatory activity and reasonable radioprotective action in mice, due to the presence of nepitrin. Agrawal (1982) [36] investigated the anti-inflammatory efficacy of nepitrin (5,3',4'-trihydroxy-6-methoxy flavone), a flavonoid, isolated from *N. hindostana* in both acute and chronic models of inflammation in rats. Nepitrin was found to possess significant anti-inflammatory activity in the exudative and proliferative phases of inflammation. This action of nepitrin could be due to its anti-bradykinin and anti-angiotensin action. Nepitrin also possessed anti-pyretic and weak analgesic activity. The essential oil extracted from the plant also showed antifungal and anti plasmodial activity.

Anti-Alzheimer activity

Akhondzadeh *et al.*, (2003) [37] evaluated potential effect of *N. hindostana* extract in 42 patients of both sexes with mild to moderate Alzheimer's disease aged between 65 and 80 years, with a score of > or = 12 on the cognitive subscale of Alzheimer's disease assessment scale (ADAS-cog) and <or= 2 on the clinical dementia rating (CDR). In this study the main efficacy measures were the change in the ADAS-cog and CDR-SB scores compared with baseline. After four month with the treatment of extract of Badrnjboya it produces a significantly better outcome on cognitive function than placebo.

Conclusion and recommendation

Badranjboya is an important medicinal plant obtained from the *Nepeta hindostana* of family Lamiaceae, which is effective for various cardiac and psychological ailments as well as inflammatory diseases as claimed in Unani Medicine. From the above review work it is clearly concluded that this plant could be successfully used in Myocardial Infarction, Angina and Alzheimer diseases. On the basis of the survey of the drug it is recommended that the authentic Badranjboya is *N. hindostana*, so, *N. hindostana* must be considered as the genuine and authentic Badranjboya rather than *Melissa officinalis* as mentioned in some texts.

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