

# Ajwaine Khorasani (*Hyoscyamus Niger*): Traditional Wisdom and Evidence-Based Pharmacological Applications

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## ABSTRACT

**Background:** Ajwaine Khorasani (*Hyoscyamus Niger*), is one of the most important and largest genera of the family Solanaceae, comprising about 84 genera and more than 3000 species. All *Hyoscyamus* species are rich sources of tropane alkaloids, mainly hyoscyamine and scopolamine. Phytochemical analyses have shown that *Hyoscyamus* species contain alkaloids, flavonoids, tannins, terpenes, saponins, carbohydrates, cardiac glycosides, and anthraquinones. These phytoconstituents exhibit a wide range of pharmacological activities, including antidiabetic, antioxidant, anticancer, insecticidal, antiasthmatic, antiallergic, antidiarrhoeal, antisecretory, hepatoprotective, antihyperuricemic, calcium channel-blocking, hypotensive, cardioprotective, antiparkinsonian, anticonvulsant, antidepressant, and anticholinergic effects, primarily attributed to the presence of tropane alkaloids.

**Aim and Objective:** The objective of the review is to study the historical, traditional, and ethnomedicinal importance of *Hyoscyamus niger* and evaluate its phytochemical constituents and pharmacological activities.

**Material and Methods:** Books and online resources were explored and the source material was compiled from traditional Unani texts like *Khazain al-Advia*, *Makhzan al-Advia*, *Al-Jami li Mufradat al-Advia wa'l Aghziya*, *Al Qanoon Fit Tibb*, etc. Scientific evidence was searched from databases like PubMed, Scopus, Web of science, Wiley Online Library, Google Scholar, and others.

**Results:** The review revealed that *Hyoscyamus niger* possesses diverse phytochemicals, particularly tropane alkaloids such as hyoscyamine and scopolamine, which contribute to its significant pharmacological activities including anticholinergic, anticonvulsant, antioxidant, antidiarrhoeal, antidepressant, and anticancer effects. The traditional uses described in Unani medicine were found to correlate with several modern scientific findings.

**Conclusion:** *Hyoscyamus niger* is an important medicinal plant with strong traditional and evidence-based therapeutic potential. Its rich phytochemical composition supports many pharmacological applications, indicating the need for further clinical and toxicological studies for safe and effective therapeutic use.

**Keywords:** *Hyoscyamus niger*, Ajwaine Khorasani, Unani Medicine, Pharmacological Activities, Traditional Uses

## INTRODUCTION

Hyoscyamus Niger, commonly known as henbane, is a medicinal plant of the Solanaceae native to Asia and Europe. It contains toxic tropane alkaloids such as hyoscyamine and scopolamine and is found in India from Kashmir to the Garhwal Himalayas at elevations of 8000–11,000 feet.<sup>[1]</sup> Due to its toxicity, Hyoscyamus niger should be used with caution. Although traditionally used in Chinese and Indian medicine, limited scientific evidence supports its analgesic, anti-inflammatory, and antipyretic effects.<sup>[2]</sup> Hyoscyamine is a volatile alkaloid that is therapeutically more potent than hyoscyamine. Recent cultivation of Hyoscyamus niger in Saharanpur and Kashmir has shown improved alkaloidal content, approaching British Pharmacopoeia standards.<sup>[3]</sup> Earlier Kashmiri samples of Hyoscyamus niger contained lower alkaloid levels (0.03%) than British Pharmacopoeia standards, but recent reports indicate that their alkaloidal content now matches imported B.P. varieties.<sup>[4]</sup>

## SCIENTIFIC CLASSIFICATION<sup>[4][5]</sup>

<p><b>Arabic:</b> Ajwaine kharasani, Bazrulbanj, bazriulabanja, sikram</p> <p><b>English:</b> Black henbane, Common henbane, Belene, Brosewort, Henbane, Henbell, Hogsbean, Loaves of bread, sickly smelling henbane, Symphonica, Hyosmamus</p> <p><b>Hindi:</b> Khurasaniajavayan, Ajwainakurasam, Buzrool</p> <p><b>Persian:</b> Bang, Bazrulbanj</p> <p><b>Sanskrit:</b> Dipya, Parasikava, yavani, Kuberakhya, Madaka, Madakarini, Mani, Parasikaya</p>
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## SYNONYMS<sup>[3][4][6][7][8][9]</sup>

<p><b>Kingdom:</b> Plantae</p> <p><b>Division:</b> Tracheophyta</p> <p><b>Class:</b> Magnoliopsida</p> <p><b>Order:</b> Solanales</p> <p><b>Family:</b> Solanaceae</p> <p><b>Genus:</b> Hyoscyamus</p> <p><b>Species:</b> Hyoscyamus albus, Hyoscyamus niger and Hyoscyamus reticulatus</p>
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Figure 1: *Botanical description and Vernaculars of Ajwaine Khorasani (Hyoscyamus Niger)*

### 1.1 Ethnobotany

The plant is a cultivated herb with a robust stem, growing about 0.3–0.9 m tall, though some varieties may reach up to 6–12 feet. The leaves are radical, stalked, coarsely sinuate-toothed, oblong-ovate, and about 15–20 cm long. They are thick, hairy, green to blackish in colour, and possess a spicy, bitter taste similar to ajwain. The flowers are pale yellowish-green with purple veins darker at the centre, nearly sessile, and arranged in long one-sided spikes. The calyx is ovoid with a funnel-shaped, five-toothed limb, while the corolla is also funnel-shaped with five broad and slightly unequal lobes. The ovary is two-celled with a style longer than the stamens. The fruit is a compressed, sub-discoid capsule enclosed within the enlarged

globose calyx, opening transversely when mature. The seeds are sharp, pungent, heating, stomachic, astringent to the bowels, and considered toxic. The seeds are the main part used for medicinal purposes.<sup>[6][7][8]</sup>



**Figure 2: Structure of plant, Leaves, Flowers, Fruit and Seeds<sup>[10][11][12][13][14]</sup>**

### 1.2 Unani (Traditional) description of Ajwaine khorasani (*Hyoscyamus niger*)

Ajwaine Khorasani refers to the seeds of a plant with leaves resembling Badranjboya, though broader and darker in colour. The seeds are similar to Hulba (methi) seeds but smaller in size. It occurs in three varieties—black, red, and white—all having a strong odour and a bitter, pungent taste similar to desi ajwain.<sup>[1][15]</sup>

The fruits are borne at the tips of the branches, resembling Tukhme Kasoos. In ancient times, this plant was imported from Khorasan, and because its seeds resembled ajwain, it came to be known as Ajwaine Khorasani. The medicinal use of Ajwaine Khorasani has evolved across different traditions and time periods. Ancient Unani physicians used various parts of the plant, including roots and seeds, while modern Unani practitioners mainly prefer the white seeds, though market samples are usually khaki-coloured. In Vedic medicine, the seeds are valued for their therapeutic effects, whereas ancient Greek healers used both leaves and seeds. Today, the leaves, flowers, and seeds are all utilized after the plant matures. Traditionally, the plant was used for inducing sleep, relieving earache, toothache, eye pain, and uterine

disorders. Its smoke was considered intoxicating and was also used for dental caries. Preparations with vinegar, honey, rose oil, or opium were commonly employed for pain relief and sedative effects.<sup>[3][7]</sup>

### 1.3 Temperament (Mizaj)

Temperament of Ajwaine khorasani (*Hyoscyamus niger*) given by various Unani scholars in literature are:

Sard wa khushk 3<sup>o</sup>[1][4][8] Barid yabis 3<sup>o</sup>[16]

**Siya(black):** Sard wa khushk 3<sup>o</sup>[17][18] Sard wa khushk 4<sup>o</sup>[3]

**Sufaed(white):** Garm wa Khusk 3<sup>o</sup> [18] Sard wa khushk 3<sup>o</sup>[16] Sard wa khushk 2<sup>o</sup>[3]

**Surq(red):** Garm wa Khusk 3<sup>o</sup> [18] Sard wa khushk 3<sup>o</sup>[3]

### 1.4 Parts Used (Hissae Mustamela)

Dried & fresh leaves, Flowering tops, flowers with the branches<sup>[3]</sup>

## 2. MATERIAL AND METHODS

This review was accomplished keeping in mind the most recent information regarding *Hyoscyamus N.* The information was collected from Unani classical books (Arabic, Persian and Urdu) and electronic search (Pub Med, Science Direct, Wiley online library and Google scholar) during 2022-2025. The Unani terminologies were taken using the Standard Unani Medical Terminology published by the Central Council for Research in Unani Medicine (CCRUM) and the World Health Organization (WHO)<sup>[19]</sup>

## 3. RESULTS AND DISCUSSION

### 3.1 Phytochemistry

Ajwaine Khorasani (*Hyoscyamus niger*) contains a wide range of phytochemicals, particularly tropane alkaloids, coumarinolignans, metabolites, and ketones distributed in different plant parts. Major active constituents include hyoscyamine, scopolamine (hyoscine), hyoscyamine-N-oxide, tropine, tropinone, apoatropine, apohyoscine, hygrine, littorine, and belladonines.<sup>[5]</sup> The seeds contain coumarinolignans such as cleomiscosin A, cleomiscosin B, cleomiscosin A methyl ether, venkatasin, and hyosgerin.<sup>[6][4]</sup> Leaves also contain skimmianine, choline, fatty oil, mucilage, albumen, and potassium nitrate, while the roots are rich in tropane derivatives, metabolites, and ketonic compounds including  $\psi$ -tropine, 2-piperidone, 2-pyrrolidone, pelletierine, quinuclidinone, and cyclohexanone derivatives. These phytoconstituents contribute to the plant's medicinal, sedative, anticholinergic, and toxic properties.<sup>[20]</sup>

### 3.2 Pharmacological Actions (Af'aal):<sup>[21]</sup>



Figure 3: Pharmacological Actions (Af'aal) of Ajwaine khorasani (*Hyoscyamus niger*)

### 3.3 Therapeutic Uses (Mawaqe Istemaal)

Below are the Uses (Af'āl) and therapeutic uses (Mawāqi' Isti'māl) of *Hyoscyamus niger* described in classical Unani literature and modern literature.

Sl.no.	Af'āl	Mawāqi' Isti'māl	Reference
1.	Musakkin	Due to its musakkin & muqaddir property it is beneficial in balghami khansi, also used for external application in all kinds of pain like wajaulmafasil, irqunnisa, niqris	[1][3][22]
2.	Muqaddir	Buqoor is adopted after putting on fire in darde dandaan, by heating in roghane kunjad & instilling in the ear will reduce pain,	[1][3][22]
3.	Munavim	Beneficial in junoon, hizyan, beqwabi	[1][3]

4.	Habis	Beneficial in all the bleeding tendencies of each organ, reduces sailane rutubat & nuzlat towards eyes.	[3]
5.	Raddaemawad	Reduces awram by applying tila primarily	[1][3][15]

**Table 1 :Uses (Af'āl) and therapeutic uses (Mawāqī' Isti'māl ) of Hyoscyamus niger**

**Pharmacological Action of different parts of Ajwain-e-Khorasani (Hyoscyamus niger)**

Sl. No.	Pharmacological Action (Af'āl)	Parts	References
1.	Intoxicating	Seeds	[23]
2.	Narcotic	Seeds, leaves	[23][24][25]
3.	Anodyne	Seeds	[23]
4.	Digestive	Seeds	[23]
5.	Astringent	Seeds	[23]
6.	Anthelmintic	Seeds	[23]
7.	Anodyne	Leaves	[23][24][26]
8.	Sedative	Leaves	[23][24][27]
9.	Antispasmodic	Leaves	[23][28][27]
10.	Stimulant	Leaves	[23]
11.	Mydriatic	Leaves	[23][24]
12.	Deliriant	Plant	[23]
13.	Hypnotic	Plant	[23]
14.	Laxative	Plant	[23]
15.	carminative	plant	[23]
16.	Expectorant	leaves	[24]
17.	Aphrodisiac	seeds	[24]
18.	Hypnotic	seeds	[24]
19.	Haemostatic	seeds	[24]
20.	Depilatory	seeds	[24]
21.	Astringent to the bowels	seeds	[24]
22.	Useful in nasal troubles	seeds	[24]
23.	Watering of eyes, ophthalmia	seeds	[24]
24.	Earache, fevers, headache, pain in the joints	seeds	[24]
25.	Smoke is useful in scabies, caries of the teeth, bronchitis, hypnotic	seeds	[24]
26.	Useful in irritable conditions, nervous affections, asthma, whooping cough	leaves	[24][26]

**Table 2: Pharmacological Action of different parts of Ajwain-e-Khorasani (Hyoscyamus niger)**

### 3.4 Therapeutic Doses (Miqdare Khuraak)

#### Kamil(Adult):

- Sufaed – 2-3 masha<sup>[18]</sup>
- Surq – 2-4 masha<sup>[18]</sup>

#### NaqisPediatric):

- Sufaed – 1- 2 ¼ masha<sup>[18]</sup>
- Surq – 2 masha<sup>[18]</sup>
- ½ -1 masha<sup>[1][8]</sup>
- 3 masha<sup>[15]</sup>

### 3.5 Badal (Substitute) <sup>[1][8][18]</sup>

- Afiyun
- Ajwaine desi
- Khashkhash siya

### 3.6 Musleh (Correctives)

- Shahed, Anisoon <sup>[1][17][16][18]</sup>
- Sufed -shahed<sup>[1]</sup>
- siya- qai<sup>[1]</sup>

### 3.7 Safety Aspect

The drug used in traditionally prescribed doses may be considered safe.<sup>[29]</sup>

### 3.8 Famous Important formulations (Mashhur Murakkabat)

Barshasha, Hubbe sikran, Qurse musallas, Dawae dama, Qurse Tankar<sup>[30]</sup>

## 4. Conclusions

In conclusion, *Hyoscyamus niger* occupies an important place in the Unani System of Medicine due to its wide range of therapeutic applications described in classical texts. Ancient Unani scholars recognized its potent analgesic, sedative, antispasmodic, anti-inflammatory, and nervine properties, and recommended its use in conditions such as pain, insomnia, cough, asthma, neural disorders, colic, diarrhea, and joint diseases. The traditional uses documented by renowned physicians including Ibn Sina and Zakariya Razi reflect a deep empirical understanding of the drug's pharmacological potential. Modern scientific investigations further support many of these classical claims by demonstrating the presence of biologically active alkaloids and phytoconstituents responsible for its therapeutic effects. However, owing to its potent narcotic and toxic nature, its use requires careful dosage regulation and professional supervision. Therefore, further pharmacological, toxicological, and clinical studies are needed to validate its traditional applications and ensure its safe and effective therapeutic utilization in contemporary medicine.

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