

## PHYTOPHARMACOLOGY OF AN IMPORTANT UNANI DRUG *BAZR-UL-BANJ* (*HYOSCYAMUS NIGER* LINN.) – REVIEW

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### ABSTRACT

**Objective:** *Bazr-ul-Banj* syn. *Ajwain khurasani* (*Hyoscyamus niger* Linn.) is one of the important drug mentioned in Unani literature. It mentioned by the great Unani philosopher Dioscorides (first century AD) in his treatise *Kitab-al-Hashaish*. According to Unani philosophy, *Bazr-ul-Banj* is in third-degree category according to its temperamental nature. *H. niger* Linn. contains tropane alkaloids in good quantity, mainly hyoscyamine and scopolamine.

**Methods:** Unani classical literature was searched from recent to past available in different libraries. For phytochemistry, pharmacology, and clinical studies to prove, the importance computerized databases such as Medline, PubMed, Ovid SP, Google Scholar, and Science-direct were searched. All the information of plant available in Urdu, Persian, Arabic, and studies published abstract were included in the study.

**Results:** Fourteen Unani books were referred and 18 pharmacological studies were recognized. The action of *Bazr-ul-Banj* mentioned in Unani classical literature are *Hazim* (Digestive), *Mudammil* (Cicatrizant), *Mujaffif* (Dessicant), *Mukhaddir* (Anesthetic), *Munashshi* (Narcotic), *Munawwim* (Hypnotic), *Musakkin* (Sedative), *Musakkin-e-Alam* (Analgesic), *Raade* (divertive), *Qabiz* (Astringent), etc., and useful in *Amraz-e-asbania* (nervous affections), *Amraz-e-Raham* (uterine spasm and pain), *Dard wa Alam* (pain), *Ikhtelaj-e-Qalb* (palpitation), *Junoon* (mania), *Niqras* (Gout), *Zeequn Nafas* (Bronchial asthma), etc. *H. niger* Linn. showed many pharmacological effects included antimicrobial, anticancer, analgesic, anti-inflammatory, antipyretic, antihypertensive, and antidiarrheal activities in different clinical and experimental studies.

**Conclusion:** This presentation is an attempt to showcase the action, uses mentioned in Unani literature, chemical constituent, and pharmacological and toxicological effects at one place. It may also observe that the drug is having many actions which may be beneficial in cases of COVID-19. It may be concluded this should be tested as adjuvant medicine in cases of COVID-19.

**Keywords:** *Ajwain khurasani*, *Bazr-ul-Banj*, *Hyoscyamus niger* Linn., Unani medicine.

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### INTRODUCTION

Unani system of medicine (USM) is one of the oldest systems of medicine based on Hippocratic theory of Akhlat-e-arba (four humors). In this system the drugs are used from three sources, plant, animal, and minerals origin; however, the main source is plants and their products. According to the World Health Organization presently, 80% of the world population depends on herbal medicine for some aspect of primary health care. However, plants still provide some of our most valuable medicines [1-15].

*Bazr-ul-Banj* (*Hyoscyamus niger* Linn.) [16] is a native of Himalaya, but in use since a long time in USM. Dioscorides (first century AD) the great Unani physician and philosopher has mentioned the preparation of a sun-dried extract from the juice of the fresh whole plants or seeds is useful for the treatment of sleeplessness and pain [17]. He says that the dried aqras (pills) prepared from the extract pounded with flour, can retain their medicinal properties for 1 year [18]. Probably, the ancient ayurvedic physicians were not aware of it. It was introduced to India during 9<sup>th</sup> century [19]. Henbane is literally translate "*Hen Killer*" [20] and its name derived from the anglo-saxon (hen (chicken) and bana (Murderer) because when fowls eat its seeds, they become paralyze and die [21]. It grows in two distinct forms annual and biennial. Stem is simple thick and about 0.5 m high leaves are dark in color, hairy with an irregular border, the fruits like that of pomegranate full of seeds resembling poppy seeds. Flowering time is during July and August corolla is paler in color and deeply veined. It is also found in Europe, Sabaria, Egypt, and Iran. Its taste is bitter. Unani scholars describe its

three varieties according to color of its flowers, for example, white, black, and red. White flower is considered best for medicinal purposes. Extract of henbane seed, leaves, and root are used by some witches to run or fly on fire and when thieves come to rub them [22]. It is toxic plant exposure to potentially either intentionally or accidentally could induce toxic manifestation [23-25]. Nearly 900 patients during 1981–1991 were referred to the poison center of Imam Reza of Mashhad of Iran due to its poisoning [26,27].

### METHODS

Unani classical literature was searched from recent to past available in different libraries. For phytochemical, pharmacological activities, and clinical trials carried out to prove the importance of *Bazr-ul-Banj* (*H. niger* Linn.), computerized databases such as Medline, PubMed, Ovid SP, Google Scholar, and Science-direct were searched. All the information of plant available in Urdu, Persian, Arabic, and studies published abstract were included in the study. Fourteen Unani books were referred and 18 pharmacological studies were recognized.

### Taxonomic classification

Kingdom: Plantae  
 Division: Tracheophyta  
 Subdivision: Spermatophytina  
 Class: Magnoliopsida  
 Family: Solanaceae  
 Genus: *Hyoscyamus*  
 Species: *Hyoscyamus albus*, *H. niger*, and *Hyoscyamus reticulatus*.

### Temperament

The USM describes the general character of a drug in terms of its temperament. According to Unani philosophy, drugs are classified as per the specific temperament (Mizāj) and are graded in the first, second, third, and fourth-degree according to their potency. According to this philosophy of Unani system, *Bazr-ul-Banj* is cold and dry in the third degree of temperament [28-35].

### Part used

As per Unani classical literature, seeds and leaves are used for various therapeutic purposes.



### Action

Unani scholars mentioned its action as: *Habis* (Retentive) [28,29,31,32,35-41]; *Hazim* (Digestive) [31,36]; *Mudammil* (Cicatrizant) [31]; *Mujaffif* (Desiccant) [32,36,37]; *Mukhaddir* (Anesthetic) [29,31,35,37,38,41]; *Munashshi* (Narcotic) [28,31,36]; *Munawwim* (hypnotic) [28-35,37-39,41]; *Musakkin* (Sedative) [28,29,32-41]; *Musakkin-e-Alam* (Analgesic) [29,31,32]; *Raade* (divertive) [29,35-38,41]; and *Qabiz* (Astringent) [31,32,36].

### Potent action

The potent action of this plant is *Musakkin* (sedative) [29,35].



### Uses

It is useful in *Amraz-e-asbania* (nervous affections) [28,29,31,32]; *Amraz-e-Raham* (Uterine spasm and pain) [28,31,32,37,40]; *Asbi dard* (neuralgia) [28,31,32]; *Bars* (Vitiligo) [40]; *Bawaseer* (hemorrhoids) [31]; *Dard wa Alam* (pain) [28,31,32,35,37,39]; Epiphora [28,31,32,34,39,41]; *Fuwaq* (Hiccup) [27,31,32]; *Ikhtelaj-e-Qalb* (palpitation) [28,31,32]; *Iltihab/warm* (inflammation) [28,31,32,34,37,39]; *Irqun Nisa* (sciatica) [31,37,39,41]; *Jirayn-ud-dam* (hemorrhage) [31,35,38,41]; *Junoon* (mania) [31,35,41]; *Kharish* (Pruritis) [31]; *Malikholia* (Melancholia) [31]; *Nafs-ud dam* (hemoptysis) [28,31,32,37,39,41]; *Nazla* (Catarrh) [28,31,41]; *Niqras* (Gout) [31,35,37-39,41]; *Nisyan e Muzmin* (Ch. Dementia) [28,31,32,41]; *Quolanj* (Colic) [31]; *Qurooh-e-Raham* (uterine ulcers) [31]; *Sahr* (insomnia) [31,41]; *Sailan-ur-reham* (leucorrhoea) [28,31,32,34,37,39]; *Shahiqa* (whooping cough)

[28,31,41]; *Suda* (Cephalgia) [28,31-34,37,39]; *Waja-ul Asnan* (Toothache) [28,31,32,34,35,37-39,41]; *Waja-ul Mafasil* (poly arthritis) [31,35,37,39,41]; *Waja-ul Meda* (gastralgia) [31]; *Waja-ul Uzn* (otalgia) [28,31,32,34,35,37,39,41]; *Warm-e-Khusyatein* (Orchitis) [28,31,37]; *Warm-e-Hanjara* (Laryngitis) [28,31,37]; *Warm-e-Pistan* (Mastitis) [28,31,37]; and *Zeequn Nafas* (Bronchial asthma) [28,29,31,35].

### Ethnopharmacology action

In ethnobotanical books, the action of the plants is mentioned as: Anti-inflammatory [19,42]; antispasmodic [42,43]; intoxicating [19,43]; anesthetic [16]; narcotic [18,43,44]; hypnotic [18,43,44]; sedative [18,43,44]; analgesic [18,19,42-45]; mydriatic [42-46]; and astringent [42-44].

### Ethnomedicinal uses

This plant may be used in various disease, that is, nervous disorders [18,44]; uterine spasm [18,19,42,44]; uterine pain [18,19,42,44]; neuralgia [19,43-45]; epiphora [19,43,44]; hiccup [19,43]; functional palpitation [19,43]; inflammation [19,43,44]; mania [19,43]; locomotor alexia [18,44]; melancholia [19,43]; maniacal excitement [19,43,46]; hemoptysis [44]; catarrh [42-45]; chronic dementia [19,43]; insomnia [19,43]; leucorrhoea [19,43,44]; whooping cough [42-45]; cephalgia [19,43,44]; toothache [19,43,44]; algia [19,42,44]; orchitis [19,42-44]; laryngitis [43]; mastitis [19,42-44]; and asthma [19,42-45].

### Dose

In Unani classical text, the dose of *Bazr-ul-Banj* is mentioned 500-750 mg [31,35,41].

### Substitute

In Unani classics, it is also refer that in case of non-availability of the drug substitute may be used. It is stated that *Afiyun* (*Papaver somniferum*); *Balchar* (*Nardostachyas jatamansi*); *Luffah* (*Atropa belladonna*); and *Tukhme-Karafs* (*Apium graveolens*) [31,32] may be used.

### Corrective

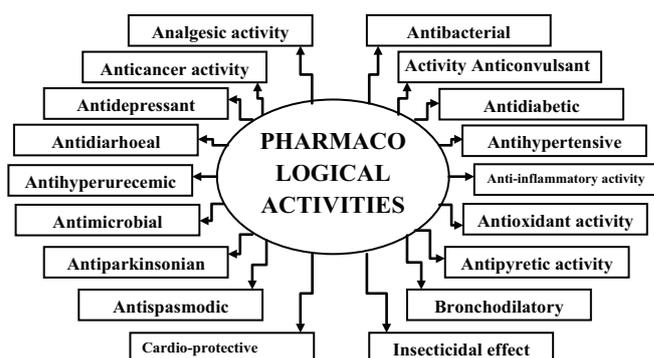
To counter any adverse effect of drug, some corrective measure may be adopted. For this *Shahad* (Honey) [35] Ghee (Clarified butter), *Doodh* (Milk), *Khaskhash* (*P. somniferum*), *Anisoon* (*Pimpinella anisum*), and Milk of sheep [30,31] may be used along with the drug to avoid any adverse reaction.

### Chemical constituents

*H. niger* seeds were reported to contain alkaloid (hyoscyamine, hyoscyne, scopolamine, atropine, etc.) [22,47,48], volatile oil, glycoside, mucilage, albumin, steroidal glycosides (atroposide A, atroposide C, atroposide E, and petunia side L), phenolics, (vanillic acid, vanillin, pinosresinol, and N trans-feruloyl tyramine), and phytosterols (daucosterol and beta-sitosterol), etc. [49,50].

### Pharmacological studies

Many pharmacological studies were conducted on the plant in different experimental models. These pharmacological activities are alphabetically arranged here.



**Analgesic activity**

The methanolic extract of seeds of *H. niger* and leaves of *H. albus* showed analgesic activity in experimental animal models at different doses in hot plate reaction time and writhing response [51-53]. Hydroalcoholic extract of seeds decreased the formalin-induced acute and chronic pain significantly through parental and oral route relative to the control group [54,55]. Methanolic extract of *H. reticulatus* L. possesses a significant antinociceptive activity in both central and peripheral pain models in mice [56]. The crude extract of *H. niger* reduced the numbers of acetic acid-mediated writhes in mice in dose-dependent manner [57].

**Antibacterial activity**

Alkaloidal extract showed antibacterial activity against microorganisms: *Pseudomonas stutzeri*, *Staphylococcus aureus*, *Escherichia coli*, and *Klebsiella pneumonia* [58].

**Anticancer activity**

Alkaloidal extract showed anticancer activity by reducing the spontaneous frequency of chromosomal aberrations, micronuclei assay, and increased the mitotic index in mice bone marrow cells. Alkaloidal extract also induced apoptosis activity rather than cytotoxic activity against cancer cell lines (A549, PC-3) [27]. Compounds grossamide, and cannabins D, and G isolated from *H. niger* seeds exhibited moderate cytotoxicity in cultured LNCaP human prostate cancer cells [59].

**Anticonvulsant activity**

Methanolic extract of *H. niger* L. possess the anticonvulsant activity against picrotoxin-induced seizures in mice by increasing latency and duration of seizure also delayed the death as compared to control [60]. Alcoholic seed extract of *H. niger* has markedly alleviated pentylenetetrazol-induced seizure phases in male mice [61].

**Antidepressant effect**

*H. niger* leaves ethanolic extract significantly reduced immobility duration of mice in forced swim test and tail suspension test in higher dose; it also showed anxiolytic activity [62].

**Antidiabetic activity**

Calystegines, polyhydroxylated alkaloids extracted from *H. albus* seeds showed antidiabetic effect on streptozotocin-induced diabetes in mice by markedly reducing blood glucose levels and minimized damages on  $\beta$ -cells of islets of Langerhans, also stimulated  $\beta$ -cells regeneration, and improved insulin secretion [63]. The oral administration of methanolic extract of leaves of *H. albus* significantly reduced the levels of blood glucose and glycosylated hemoglobin in streptozotocin-induced diabetic rats [64].

**Antidiarrheal activity**

The crude extract of *H. niger* seeds exhibited antidiarrheal and antisecretory effects against castor oil-induced diarrhea and intestinal fluid accumulation in mice [65].

**Antihypertensive**

*H. niger* crude extract lowers blood pressure through a  $Ca^{++}$ -antagonist mechanism in dose-dependent manner in rats and guinea pig models, also exhibited a cardio depressant effect on the rate and force of spontaneous atrial contractions [66].

**Antihyperuricemic activity**

Aqueous extract showed an inhibitory effect on xanthine oxidase activity, oral administration of the aqueous extract significantly reduced serum urate levels in hyperuricemia induced in mice in a dose-dependent manner [67,68].

**Anti-inflammatory activity**

The methanolic extract of seeds of *H. niger* showed an anti-inflammatory effect in carrageenin-induced paw edema and cotton pellet granuloma methods [51].

**Antimicrobial activity**

The butanolic extract of *H. albus* possessed antibacterial effects against *S. aureus*, *E. coli*, *P. stutzeri*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, and *K. pneumonia* [58,69,70]. The methanol extracts of the seeds of *H. niger* showed antimicrobial effect against urinary tract pathogens (*Enterococcus faecalis*, *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *P. mirabilis*, and *Candida albicans*) [71-73].

**Antioxidant activity**

Aqueous methanol extract significantly inhibited monoamine oxidase activity and attenuated 1-methyl-4-phenyl pyridinium (MPP<sup>+</sup>)-induced hydroxyl radical ( $\cdot OH$ ) generation in isolated mitochondria [67,69,70,74]. Methanolic extracts of *H. albus* exhibited maximum 2, 2-diphenyl-1-picrylhydrazyl (DPPH) antiradical, nitric oxide scavenging, and metal chelating activities [75] compared to  $\alpha$ -tocopherol [67,76]. Aerial parts of *H. niger* extract exhibit DPPH and ferric, reducing antioxidant scavenging properties [77]. Hexane and water extracts of *H. reticulatus* showed radical scavenging, antioxidant capacity, ferric, and cupric reducing powers [78].

**Antiparkinsonian**

Aqueous methanol extracts of *H. niger* seeds significantly attenuated motor disabilities (akinesia, catalepsy, and reduced swim score) and striatal dopamine loss in -methyl-4-phenyl-1,2,3,6-tetrahydropyridine treated mice [74] and also against the stereotaxically induced rotenone model of Parkinson's disease in rats due to antioxidant activity [79].

**Antipyretic activity**

*H. albus* methanolic extract showed a dose-dependent lowering effect of the body temperature up to 3 h in comparable to paracetamol [52,53]. Methanolic extract of seeds of *H. niger* exhibited antipyretic activity in yeast-induced pyrexia model [51].

**Antispasmodic activity**

The crude extract of *H. niger* seeds inhibited contractions induced by carbachol and potassium in a pattern similar to that of dicyclomine, but different from verapamil and atropine [65].

**Bronchodilatory effect**

The crude extract of *H. niger* exhibits airways relaxation, inhibition of the CCh-induced increase in the inspiratory pressure of anesthetized rats [57].

**Cardioprotective activity**

Oral administration of crude powder of the *H. niger* protected rats from the cardiac damage induced by lipid peroxidation and activation of antioxidant enzymes. It protected from cardiac necrosis as evidenced by the inhibitory activity on CK-Mb and TGL [80].

**Insecticidal effect**

Methanol extract of aerial parts and flower of *H. niger* had destroyed the mosquitoes *Anopheles* spp. larvae [81].

**Contraindicated and adverse effect**

*Bazr-ul-Banj* has an adverse effect on the brain as *daur ul raas* (vertigo), *Sadr* (Giddiness), *Khunaq* (Diphtheria), *Junoon* (Mania) [27,28,45]. Ingestion of *Bazr-ul-Banj* by patients with medical underlying problems such as Down syndrome, narrow-angle glaucoma, cardiac disease, pregnancy, and breast-feeding needs more attention fatalities were reported in children [26,82-85].

**Unani formulations**

According to USM, the choice of drugs for treatment is governed by three laws: (i) Quality of drug in terms of temperament, (ii) quantity of drug in terms of its weight and potency, and (iii) time of administration. The selection of drug depends on the nature and type of the disease. To achieve the target, single and compound formulations were prescribed. The Unani Drugs are being manufactured mostly in the classical form. Modern instruments are used in the preparation of drugs. Sometimes,

minor alterations are made in the dosage forms, and due care is taken not to depart from the essence. The Unani Drug Industry is preparing and marketing two types of drugs: (i) Classical Unani formulations and (ii) patent and proprietary products. Good manufacturing practices are followed to ensure quality control of these drugs. Some important classical Unani formulations in which *Ajwain khurasani* is one of the ingredients mentioned in National Formulary of Unani Medicine.

Banadiqu Bazoore [86]	Habbe Jadwar [86]	Habb-e-Tinkar [86]
Tiryaq-e-Nazla [86]	Qurs Mukhaddir [86]	Qurs Musallas [86]
Safoof Moya [86]	Barshasha [86]	Habb-e-Jazla [86]
Habb-e-Rasha [86]	Habb-e- Shingraf [86]	Habb-e-Sultani [87]
Qurs Khashkhas [87]	Habb-e-Aswad [87]	Majoon Kakanaj [87]
Jawarish Shahinshahi Ambri [87]	Habb-e-Jiryani [88]	Habb-e- Muqawwi [88]
Lauq bazr-ul banj [88]	Roughan <i>Bazr-ul- Banj</i> [89]	

## CONCLUSION

The present review emphasizes the action and uses mentioned in Unani classical literature, ethnopharmacological, photochemistry, pharmacological reports, and toxicological information of *Bazr-ul-Banj* (*H. niger* Linn.). It may be concluded that many pharmacological reports proved the claims of Unani scholar's, for example, Musakkin-e-Alam [29,31,32] (Analgesic) [51-57], *Iltihab/warm* [28,31,32,34,37,39] (inflammation) [51]; *Ikhtelaj-e-Qalb* [28,31,32] (cardioprotective) [80,81]; *Zeequn Nafas* [28,29,31,35] (Bronchodilatory) [57], etc., many more action mentioned in Unani literature are required still proved. It is suggested that the results of experimental studies may be taking up forward for clinical safety and efficacy studies at a large sample size. It may also be observed that important Unani herb is having analgesic, antipyretic, anti-inflammatory, bronchodilator [51-57], anti-diarrheal [65], antimicrobial [71-73], antioxidant [69-78], cardioprotective [80], and all these activities are required to treat COVID-19 cases. It may also be recommended that scientific community should take up the job and try this Unani drug in cases of COVID-19 as an adjuvant therapy along with the contemporary treatment. This review also guides to the scientist working in different fields of medicine, photochemistry, pharmacology may take up the steps to establish the efficacy of *Bazr-ul banj* in better way for the services in mankind in the future.

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## AUTHORS' CONTRIBUTIONS

The authors were actively searched the data on the topic from libraries of council and other Unani colleges and internet and equally contributed to the preparation of this manuscript.

## CONFLICTS OF INTEREST

The author has no conflicts of interest to share.

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