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Review Article

Anjura (*Urtica Dioica* L.): Medicinal Utility of an Underexposed Unani Herb

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Abstract

Tukhm-i-Anjura is a seed obtained from *Urtica dioica* L. of the *Urticaceae* family and used for medicinal purposes in Unani Medicine. Its leaves and flowers are also used as medicine. In the Unani System of Medicine, this is one of the most useful drugs mentioned by *Zakaria Razi*, *Malik Bin Marwan Ibn Zuhr*, etc., for the treatment of renal stones, apoplexy, coma, vesicle stones, uvulitis, paralysis, epistaxis, boils and abscesses, asthma, breathlessness, rheumatism, arthritis, gout, eczema, urinary tract infections, kidney and bladder stone, and early stages of an enlarged prostate. Studies on phytochemical investigations showed that the leaves and rhizomes are rich in phenolic compounds. The seeds and leaves of *Urtica dioica* L. contain vitamins, minerals, and amino acids. Rhizomes are found to contain agglutinin, a series of long-chain amino acid linkages. The plant has been widely used by herbalists around the world for centuries. In the first century, Greek physicians *Pedanius Dioscorides* and *Galen* reported the leaves for their diuretic and laxative properties and mentioned it useful in the treatment of asthma, pleurisy, and spleen illnesses.

Keywords: *Antimicrobial, antioxidant, stinging nettle Tukhm-i-Anjura, Urtica dioica*

Introduction

Anjura (*Urtica dioica* L.) is a perennial plant belonging to the family *Urticaceae*. It is also known as *Bichchū Būtī*, *Bichua*, and stinging nettle.[1] It grows in temperate and tropical wasteland areas around the world. It reaches 2–4 m long, producing pointed leaves and white-to-yellowish flowers [see Figure 1].[2] It is native to the colder regions of northern Europe and Asia; today, this herbaceous shrub grows all over the world[3] and is found abundantly in the Himalayas from Kashmir to Kumaun[1]. The genus name *Urtica* comes from the Latin word "*Uro*" or "*urere*" meaning "to burn" because of urticate (stinging) hairs present on the leaves and stem. The specific name "*dioica"* means "two houses" because the plant usually has either male or female flowers.[4-6] Stinging nettle grows well in nitrogen-rich soil and blooms between June and September of every year. The "stinging hairs" have very sharp spines, which are hollow and arise from a swollen base, which instantly releases acid when the hair tip pierces the skin. This acid causes itching or burning for a few minutes to a couple of days.[3] Nettle has been used externally for a long time to cure paralyzed limbs, and this method of treatment by pricking or slapping with its fresh twigs on the affected part is called "flagellation" or "urtication". This procedure may take a time of one or more minutes, once or more than once per day. The herb is credited with powerful diuretic properties. The roots and seeds are prescribed for the treatment of severe diarrhea and intestinal worms.[1] In Europe, the flowers, leaves, and seeds are all used as diuretic, astringent, and tonic.[7] In the Unani System of Medicine, this is one of the most useful drugs mentioned by *Zakaria Razi*, *Malik Bin Marwan Ibn Zuhr*, etc., for the treatment of renal stones, apoplexy, coma, vesicle stones, uvulitis, paralysis, epistaxis, boils, and abscesses. Apart from its high medicinal value, it is underexposed among the Unani fraternity due to its controversial position concerning *Tukhm Utangan* (*Blepharis edulis*) because most Indian authors have mentioned Anjura with the description of Utangan. Hence, it is the need of time to expose the drug with its proper identification and pharmacological properties.

Botanical Description

It is an erect perennial herb, 2–4 m tall with a four-sided stem, which is erect and reddish black or brown and armed with stinging hairs. They are heavy and bristly and form long-spreading rhizomes, usually in colonies.

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The leaves are opposite, cordate at the base, oblong or ovate, finely toothed, dark green above and paler beneath, arranged on the stem, and range from 3 to 15 cm long. The leaf blades could be narrowly lanceolate, rounder, or pointed at the base to broadly ovate and often ovate at the base, coarsely toothed [Figure 1a]. Some plants have broad ovate–cordate leaves, others ovate to ovate–elliptical or almost lanceolate leaves; some have large-toothed, others finely-toothed laminae. Laciniate laminae also occurs.[8] The organoleptic features of the leaves indicate a dark green color on the upper surface and a light green color on the lower surface.[9] The flowers are numerous, inconspicuous, sometimes green or tinged pink in color, and hang in the form of clusters from the upper leaf axils, with four tiny sepals and no petals. The small, green, dioecious flowers occur as racemes in the axils of the upper leaves [Figure 1b and c]. Fruits are achenes, having seeds inside, lens-shaped and flattened, 1.5 mm long, and enclosed by the inner sepals.[3]

Distribution

The genus comprises 100 species, and it is found in tropical and temperate regions throughout the World. In India, it is found in the northwestern Himalayas, from Kashmir to Shimla at an altitude of 2400–3600 m.[1,10]

Taxonomical Classification

For the taxonomical classification, see Table 1.[11]

Historical Background

Greek physicians *Dioscorides* (first century CE) and *Galen* (Circa [Ca.] 130–200 CE) reported nettle leaf for its diuretic and laxative actions and also told its usefulness in treating asthma, pleurisy, and spleen-related diseases. In Africa, India, and North America, the herb is used for nosebleeds, excessive menstruation, to treat internal bleeding, and on burns.[12]

Table 1: Taxonomical classification

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Urticales
Family	Urticaceae
Genus	*Urtica*
Species	*Dioica*

Description of *Anjura* in Unani Literature

It is a herb that grows every year in the winter and rapidly grows in spring. The stem appears reddish black or brown and has small prominent and stingy spikes. Its leaves resemble the leaves of *Mentha arvensis* L. and are thick and have prickly, tiny, trichomes on their surface. The leaves are rough and the flowers are yellow, in which fine spikes are seen and when the body comes in contact it becomes reddish and produces a burning sensation and pain on that part.[13,14] Seeds are similar to mustered in size but they are little flattened. They are very tough and their color appears green and shiny and they are enclosed in round and rough clusters. Its hairs (trichomes) are thin and long. Its leaves and flowers both are used as medicine.[13] It is emmenagogue, lactagogue, and diuretic. It acts as a deobstruent in case of obstruction in the liver and spleen. It eliminates the morbid matters of the stomach. Its oil is more powerful in all its effects than seeds, especially strongly aphrodisiac, and it is also more purgative than seeds.[14]

Mutarādifāt (Vernacular Names)

For vernacular names, see Table 2.

Ajzā-i-Musta'mala (Parts Uses)

Leaves, roots, and seeds are used medicinally.[19]

Mizāj (Temperament)

The temperament of *Tukhm Anjura* as mentioned by various physicians of Unani medicine is Hot and dry in 1st degree; some considered it in 2nd and 3rd degree.[14,19-23]

Af'āl (Actions)

It has *Musakkin-i-Alam* (analgesic) *Mukhaddir* (anesthetic),

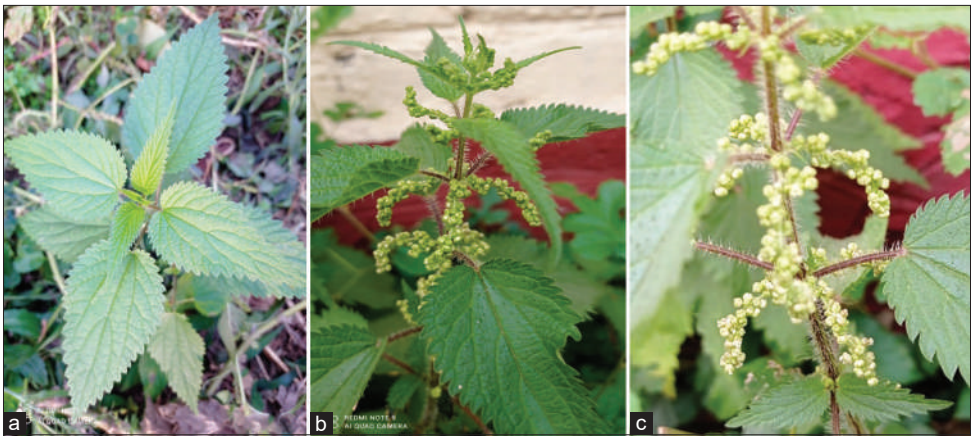

Figure 1: Showed plant (a), with flowers and fruits (b and c)

Table 2: Vernacular names in different languages

Language	Vernacular names
Arabic	*Bazr al-Anjura, Bazr al-Qarīḍ, Bazr al-Qarīs, Mujarrab al-Kalb, Qarīḍ al-Kalb, and Mujarrab al-Kilab*[15,16]
Dutch	Grote brande netel[7]
English	Stinging nettle, common nettle, greater nettle, naughty man's, plaything, nettle, scaddie, stingy nettle, tinging nettle, Chichru, Ghario, Sisunu, and Shisuna[15,18]
Finnish	*Nokainen*[18]
French	*Grande ortie, Ortage, Ortie, Ortiedioique,* and *Ortuge*[18]
German	*Estelkraut, Grosse brennessel, Haarnessel, Hartnessel, Habernessel, Heiternessel, Hirdenessel, Hirrenessel, Nessel, Scharfnessel, and Tausendnessel*[18]
Greek	*Aqlabunas*[18]
Hindi	*Bichchū Ghās, Bichchū Būtī, Bichū, Amhakan,*and *Kumhara*[7,15]
Kashmiri	*Soy*[17]
Persian	*Anjura* and *Tukhm Anjura*[15]
Punjabi	*Bichū*[15]
Roumanian	*Urgica*[7,18]
Russian	*Krapiva* and *Kropiwaschikowka*[7,18]
Spanish	*Ortiga mayor*[18]
Swedish	*Braennaetsla*[18]
Turkish	*Kajeet*[18]

Dafi'-i-Tashannuj (antispasmodic), *Dafi'-i-Ḥumma* (antipyretic), *Dafi'-i-Ta'affun* (antiseptic),[14,20] *Dafi'-i-Sal'a* (antitumor), *Muqawwi-i-Bāh* (aphrodisiac), *Butū' al-Qalb al-Jaybi* (bradycardia), *Mudirr-i-Bawl* (diuretic), *Mudirr-i-Ḥayḍ* (emmenagogue),[23,24] *Munaffith-i-Balgham* (expectorant), *Hābis-i-Dam* (Hemostyptic), *Mukhrij-i-balgham* (expectorant), *Mudirr-i-Laban*[23,24] (lactagogue), *Mulayyin* (laxative), *Mufattit-i-Hasah* (lithotriptic), and *Muhammir* (rubefacient) properties.[14,20]

Iste'mālāt (Uses)

This is used to treat *Buthūr Labaniyya* (acne)*, Ḥassāsiyat* (allergy), *Dā' al-Tha'lab* (alopecia), *Ihtibās al-Ṭamth (*amenorrhea), *Faqruddam* (anemia), *Ḍīq al-Nafas* (asthma), *Hasah* (calculus), *Sarṭān-i-Thadi* (breast cancer),[14,20] *Sarṭān-i-Udhun* (ear cancer), *Sarṭān-i-Ri'a* (lung cancer), *Sarṭān-i-Fam* (mouth cancer), *Sarṭān-i-Ṭiḥāl* (spleen cancer), *Sarṭān-i-Mi'da* (stomach cancer), *Nazla* (catarrh), *Hayda* (cholera), *Qūlanj* (colic pain), *Imtilā* (congestion), *Ḥuṣr* (constipation), *Tashannuj* (convulsion), *Huzāz-o-Ibriyya* (dandruff), *Ishāl* (diarrhea), *Zahīr* (dysentery), *Fasād al-Haḍm* (dyspepsia), *'Usr al-Bawl* (dysuria),[23,24] *Nār Fārsī* (eczema), *Udhīmā* (edema), *Ru'āf* (epistaxis), *Māshara* (erysipelas), *Ḥumma* (fever), *Niqris* (gout), *Sudā'* (headache), *Bawl al-Dam* (hematuria), *Nafth al-Dam* (hemoptysis), *Bawāsīr* (hemorrhoid), *Namla* (herpes),[14,20] *Ḍaght al-Dam Qawī* (high blood pressure), *'Ufunat* (infection), *Iltiḥāb* (inflammation), *Jarab* (itch), *Yaraqān* (jaundice), *Ḥasāh al-Kulya* (kidney stone), *A'yā'* (lethargy), *Saylān al-Raḥim* (leukorrhea),[23,24] *Wahn al-'Izām* (osteoporosis), *Waja'* (pain), *Laqwa* (palsy), *Fālij* (paralysis), *Shahīqa* (pertussis), *Waram-i-Ḥalaq* (pharyngitis), *Dhāt al-Janb* (pleurisy), *Bawāsīr* (piles/ hemorrhoid), *Ḥudār* (rheumatism), *'Irq al-Nasa'* (sciatica), *Waj' al-Ḥalaq* (sore throat),[23,24] *Waj' al-Mi'da* (stomach-ache), *Waram* (swelling), *Tadarrun Ri'wi* (pulmonary tuberculosis), *Tasammum Bawli* (uremia), *Shara* (urticaria), *Sadr-o-Duwār* (vertigo), *Dīdān-i-Am'a'* (intestinal worms), *Jurūḥ Sammiyya* (poisonous wound), and *Jurūḥ Mut'affina* (septic wound) *Jurūḥ Radiyya* (contused wound).[14,20]

In Unani classical literature, it is mentioned that the anti-inflammatory action of *Anjura* is so strong that it resolves postauricular inflammation and abscesses. And it also stimulates sexual power extremely by producing *Riyah* (gases) without hotness. If the digestion of *Anjura* takes place in the stomach it produces *Nafakh* (gases).[13] *Anjura* resolves foul-smelling abscesses, cancers, and abscesses that require dryness without heat and pain due to the dryness and demulcent effect found in it. *Jālīnūs* (Galen) has written in *Kitāb al-Aghdhiya* that the leaves of *Anjura* contain fine and soft particles that are not used as a food normally, if they are used as a food they produce constipation.[13] When the fresh leaves are kept on the prolapsed uterus, the uterus returns to its normal position. It is used in *Akkāl Marham* (corrosive ointment). Its seeds are beneficial in the case of viscous phlegm in the stomach.[13]

Tukhm Anjura has lithotriptic action in the case of renal and urinary bladder stones. *Tukhm Anjura* is used in resolving the coagulated blood from every part of the body due to its hemolytic effect.[13,14]

Tarkīb Iste'māl (Mode of Administration) in Various Diseases

For method of administration in various diseases, see Table 3.

Maḍarrat (toxicity and adverse effects)

Anjura is harmful to the liver, stomach, kidney, intestine, and anus, and its excess use produces cough.[14,20]

Musleh (Corrective/s)

Mucilaginous drugs such as *Samagh Arabī* (gum acacia) *Katīra* (gum *Katīra*) are used as corrective for the liver, stomach, intestine, and kidney. For *Maq'ad* (anus) *Unnāb* (*Zizyphus jujube* Miller.) and for cough, *Sharbat Banafsha* is used as corrective.[14,20,23]

If *Roghan Gul* is taken after eating *Tukhm Anjura* (seeds), it does not cause any burning sensation in the throat.[13,14,25]

Badal (Alternates or Substitutes)

Tukhm Gandana.[14] *Qardamana* is substituted in equal

Table 3: Diseases and method of administration

Method of administration in different diseases
Diseases of brain
Shamūm (smelling of the drugs) and *Sa'ūt* (nasal application) of *Tukhm Anjura* eliminate the morbid matters from the brain and expel thick and viscous humour also[24]
Tukhm Anjura is used in the preparation of *Ṭilā*' (liniment) which is beneficial for the treatment of paralysis[24]
Tukhm Anjura is used in the preparations for the treatment of *Sakta* (apoplexy)[26]
Tukhm Anjura is given with *Ghāriqūn* (*Agaricus albus* L.) in the case of *Subāt* (coma) if the brain is affected by *Rutūbat* (secretions)[26]
Anjura is used in the preparations for treating *Subāt* (coma)[26]
The *Ḍimād* (paste) of *Anjura* leaves with *Roghan Sosan* (*Iris oil*) is useful in '*Irq al-Nasa* (sciatica)[20]
Diseases of hair
The *Ḍimād* (paste) of *Anjura* is useful in the treatment of *Bālkhora* (*Alopecia areata*) and *Da' al-Haiyya* (snake's disease)[13,20]
If its seeds are powdered in oil and applied on the site of removed hairs, it prevents the growth of hairs at that site forever[13,20]
Diseases of the ear, nose, mouth, and throat
Gargle with extract of *Anjura* leaves relieves *Waram al-Lawzatayn* (tonsillitis)[13,14,25]
Application of *Ḍimād* (paste) of *Tukhm Anjura* (seeds) on a painful tooth, removes the tooth easily[13,14,25]
For the rapid extraction of a tooth, the equal quantity of *Tukhm Anjura* and *Qinna* (*Pinus longifolia* Roxb.) is kept in the root of the tooth[13,14,25]
Tukhm Anjura acts as deobstruent in case of obstructions of the ethmoid bone[25]
Gargle of *Barg-i-Anjura* or *Tukhm Anjura* with *Sikanjabīn*, eliminates the morbid matters from the uvula of the throat, and removes the viscous secretions from the mouth[25]
It is also used in various preparations for the treatment of uvulitis[26]
The *Ṭilā* (liniment) of leaves of *Anjura* made with olive oil removes the scars of the face[20]
The *Sa'ūṭ* (nasal application) of its seeds is useful in *Khasham* (anosmia) and deobstruent of nasal bone obstruction[20]
The *Ḍimād* (paste) of *Anjura* is useful in *Waram-i-Ḥalaq* (pharyngitis)[20]
Diseases of the respiratory system
If *Anjura* is taken orally, it expels thick *Khilt* (humor) of the chest and lungs through the mouth[13]
Taking *Anjura* leaves powder with honey, is useful in *Intisāb al-Nafas* (orthopnea), *Shusa* (intercostal neuralgia), and inflammations of the lungs. It expels the waste materials of the chest[13,14]
Ḍimād (paste) of *Safūf-i-Tukhm Anjura* (seeds powder) prepared with honey, is useful to relieve the pain of pleurisy[13,14]
Taking 7 g of *Tukhm Anjura Muqashshar* (peeled seeds) is moderate purgative of phlegm, and expulsion of thick humors takes place from the chest and lungs[13,14]
Anjura leaves expel waste materials from the chest if used after cooking with barley[13,14]
The use of *Anjura* leaves and seeds with *Ash Jau* (barley water) treats the reproductive cough and it acts as an expectorant[13,14]
The *La'uq* (linctus) of *Tukhm Anjura* (powder) with honey is very beneficial in asthma[13,14]
For the treatment of *Ribw* (bronchial asthma) *Tukhm Anjura* is a part of *Ma'jūn* for the purgation[25]
Tukhm Anjura is included in the *Nuskha* (preparation) of *Ribw* (bronchial asthma)[25]
The *La'uq* (linctus) of *Tukhm Anjura* with honey relieves '*Usr al-Tanaffus* (dyspnea/breathlessness)[25]
Syrup of *Anjura* or its *La'uq* (linctus) with syrup of Anjīr (*Ficus carica* L.) is demulcent and expectorant of morbid matter from the chest and lung[20]
The *La'uq* (linctus) of its seeds with honey is useful in cases of *Rabw* (asthma), *Diq al-Nafas* (bronchial asthma), *Intisāb al-Nafas* (orthopnea), and *Shusa* (intercostal neuralgia)[20]
The internal use of *Tukhm Anjura* with *Sikanjabīn* relives the pain of *Dhāt al-Janb* (pleurisy), *Qūlanj Kulwi* (renal colic), and *Waja'al-Ṭiḥāl* (splenic pain)[20]
Inhalation of dried leaves is used for the treatment of asthma[7]
Diseases of the digestive system
Tukhm Anjura is used in the preparations of *Tanqiya* (elimination of morbid material from the body)[25]
The internal use of *Anjura* or drinking of its decoction or extract is digestive[20]
Shiyāf (suppository) of *Tukhm Anjura* is *Mushil* (purgative) if kept in *Maq'ad* (anus) with honey[13]
The *Shiyāf* (suppository) of *Tukhm Anjura* with honey if kept in *Maq'ad* (anus), it expels the morbid matters[13]
Anjura leaves are used topically with *Qayrūti* to resolve the hard swelling of the spleen[13,14]

Contd...

Table 3: Contd...

Method of administration in different diseases
Anjura and its decoction are used as *Kāsir-i-Riyāh* (carminative)[20]
Taking 7 g of *Anjura* leaves powder orally, expels the viscous phlegm and also expels ascitic fluid with loose motions, and relives the *Qūlanj Mi'di* (gastric colic). Its oil is also beneficial in these conditions as well[20]
Anjura leaves, cooked with the crabs of rivers, are useful and act as *Mulayyin-i-Am'a'* (laxative) and *Kāsir-i-Riyāh* (carminative)[20]
The *La'uq* (linctus) of *Tukhm Anjura* with honey is useful in the case of *Warm Barid Jigar* (cold inflammation of the liver)[20]
Genitourinary disorders
The use of *Anjura* leaves, cooked with the crabs of rivers is *Mudirr-i-Bawl* (diuretic)[20]
Taking *Tukhm Anjura* with *Sikanjabīn* is beneficial in the diseases of the spleen and renal colic[13,14]
The use of *Anjura* with the meat or without meat has lithotriptic action[20,26]
For the ailments of the urinary bladder, *Anjura* is given as a vegetable[26]
The decoction of *Anjura* with *Asl-us-Sūs* (*Glycyrrhiza glabra* L.) is beneficial in the burning of the urinary bladder and testicular pain[20]
Ḍimād (paste) of *Safūf-i-Tukhm Anjura* (seeds powder) with honey, is useful to fatten the penis[13,14]
When *Tukhm Anjura* are used with the *Sharab-i-Tala* (wine of gold) or *Sharab-i-Angūr* (wine of grapes), it stimulates and potentiates sexual power[13,14]
The use of *Anjura* with *Tukhm Karafs* (*Apium graveolens* L.) and sheep milk stimulates the libido to a very high degree[20]
A *Ṭilā* (liniment) of *Tukhm Anjura* on the penis is applied for the aphrodisiac property. It fattens the genital organ (penis)[20]
The eating of *Anjura*, cooked with onion and yolk is *Muwallid-i-Mani* (spermatogenic)[20]
The half-crushed *Tukhm Anjura* with the fresh grapes juice, is taken internally, it extremely stimulates the libido[20]
Gynecological diseases
When *Anjura* seeds are used with the *Sharab-i-Tala* (wine of gold) it opens the cervix[13,14]
Anjura leaves act as emmenagogue when decoction of its leaves is used with *Murmakkī* (*Commiphora myrrha* Nees.)[13,14]
If *Anjura* is eaten by a woman, it opens the cervix and readily prepares the uterus to absorb the semen which helps to conceive[13,14]
Inflammations and wounds
Ḍimād (paste) of cooked *Anjura* leaves with ghee or fat, resolves the postauricular inflammations[13]
Application of *Anjura* leaves with table salt, treats the wounds of dog bites, poisonous, putrefied wounds, cancerous abscesses, hard nerve glands and inverted abscesses[13]
Tukhm Anjura is also applied in the preparations of *Khunāq* (diphtheria)[25]
Tukhm Anjura is used to burst and evacuate the viscous phlegmatic humor from the abscesses[26]
Anjura is beneficial in *Waj 'al-Khāṣira* (low backache)[26]
The *Ṭilā*' (liniment) or Ash of *Anjura* leaves made with wax and olive oil, resolves the *Khanāzīr* (scrofula)[13,14]
The *Ḍimād* (paste) of seeds with vinegar resolves the abscess[20]
The ash of dried roots is used to cure putrefied wounds[19]
The *Ḍimād* (paste) of seeds with honey treats *Tha'lil* (warts) and hard inflammatory conditions[20]
The *Ḍimād* (paste) of its ash with vinegar is used in gland swelling and *Jamra* (carbuncle)[20]
Hemorrhagic disorders
Administration of *Safūf* of *Anjura* leaves in the nostrils stops epistaxis bleeding. The fresh buds of *Anjura* are being put in the nostrils to cure epistaxis[13,25]
The internal use of *Anjura* or its *Ṭilā*' (liniment) has an anticoagulant effect on the blood clot anywhere in the body[20]
Sarṭān (cancer)
Tukhm Anjura and its ash are used as *Ḍimād* (past) in cancer[14,20,22]
Paste of leaves is also effective for the same purpose[14,20,22]

quantity of *Anjura*, and Sanobar (*Pinus longifolia* Roxb.) is more than three times of *Anjura*.[15,23]

The alternative to *Tukhm Anjura* is *Habbul Nīl* (*Ipomia purge* L.) in the same quantity and *Qurtum* (*Carthamus tinctorius* L.) in double quantity.[20]

Miqdār Khūrāk (Dosage): 3.75g; 1-3-1/2 g; 2 ¼ g with honey and Luke warm water.[20]

Murakkabat (Compound formulations) of *Anjura*

Murakkabat (compound formulations) in which Anjura is one of the important ingredient [see Table 4].

Bioactive and nutritional compounds

For bioactive and nutritional compound present in anjura, see Table 5.

Table 4: Compound formulations of *Anjura* with their dose action and indication[27-30]

Name of compounds	Dosage and method of administration	Indication
'Araq Ma' al Laḥm Ambari Banuskha Kalan	60–84 g with *Sharbat Anār Shīrīn*	General debility, adipogenous
Dawā' al-Kibrīt	5 g with *Arq Bādiyān*	Tonic for nerves, liver, stomach and intestine, hemiplegia, tremor[27]
Jawārish Zar'unī Ambarī	3–5 g	Tonic for the brain, liver, stomach, kidney, and semen procreator[27,28]
Jawārish Zar'unī Ambarī ba Nuskha-i-Kalan	5 g with *Arq Gāozabān*	Tonic for brain, liver, kidney, headache, and gout[29,30]
Ma'jūn Balādur	9–12 g with cow milk	General tonic, loss of libido
Ma'jūn Muqawwi 'Alvi Khan	5 mg with *Arq Gāozabān*	Loss of libido, premature ejaculation[29,30]
Ma'jūn Murawwaḥ al- Arwāḥ	1–3 g with milk	Tonic for the brain, heart, liver, stomach, and loss of libido[30]
Ma'jūn Reg Māhī	2–3 g with milk	Loss of libido[29,30]
Marham Ushaq	Local application as a paste with *Roghan Gul* and *Roghan Zayt*	Splenomegaly, scrofula[27,28]

Table 5: Bioactive and nutritional compounds

Part of the plant	Bioactive compounds	Nutritional compounds
Root	Roots include flavonoids such as kaempferol-3-O-rutinoside, myricetin, quercetin, kaempferol-3-O-rutinoside (rutin), and isorhamnetin.[3] Isolariciresinol, pinoresinol, neoolivil, secoisolariciresinol, dehydrodiconiferyl alcohol, 3,4-divanillyltetrahydrofura, phytosterols, lignans found in the root[36]	Calcium, manganese, copper, magnesium, and zinc[35]
Rhizome	Phenolic compounds[5]	Agglutinin is a series of long-chain amino acid linkages[32]
Leaves	Phenolic compounds[5] the phenolic chemicals 3-CQA, CMA, and rutin are abundant in nettle leaves[37]	Vitamins, minerals, and amino acids[2] Vitamins (Vitamins A, C, K, and B Vitamins), minerals (calcium, iron, magnesium, phosphorus, potassium, and sodium), fats (linoleic acid, linolenic acid, palmitic acid, stearic acid, and oleic acid), amino acids (all of the essential amino acids), polyphenols (kaempferol, quercetin, caffeic acid, coumarins and other flavonoids), and pigments (beta-carotene, lutein, luteoxanthin, and other carotenoids)[38]
Seeds	Fixed oil: Saturated[2,38] and unsaturated fatty acids. Carotenoids: β-carotene, lutein and violaxanthin. Polysaccharides[39]	Vitamins, minerals, and amino acids Vitamins (Vitamins A, B, C, E, and K), minerals (iron, silicon, calcium, magnesium, manganese, phosphorus, and potassium), beta-carotene, folic acid, and essential fatty acids
Whole plant	Acids such as carbonic acid, caffeic acid, caffeoylmalic acid, chlorogenic acid, formic acid, silicic acid, citric acid, fumaric acid, glyceric acid, malic acid, oxalic acid, phosphoric acid, quinic acid, succinic acid, and threonic acid[40]	Carotenoids, fatty acids, and above mentioned
	Amines such as acetylcholine, betaine, choline, lecithin, histamine, and serotonin[41] glycoprotein[42]	
	Flavonoids such as flavonol glycoside are also reported in the plant[43]	

3-CQA: 3-caffeoylquinic acid, CMA: Caffeoylmalic acid

Ethnomedicinal Uses

1. The nettle leaves are used as a nutritious supplement and as a weight-loss aid[31]
2. *Urtica dioica* L. root has a beneficial effect on enlarged prostate glands and is also used for the treatment of rheumatic gout, nettle rash, and chickenpox; externally, it is applied to bruises[32]
3. Traditionally, tea made from the leaves of *Urtica dioica* L. has been used as a cleansing tonic and blood purifier. Externally, this plant is used to treat skin complaints, gout, sciatica, neuralgia, hemorrhoids, hair problems, etc.[5]
4. *Urtica dioica* L. has a long history of use in household home remedies and a nutritious diet. The powdered leaf

extract is used as an antihemorrhagic agent to reduce excessive menstrual flow and nose bleeding. This plant was used for the treatment of arthritis, anemia, and hay fever and used as a diuretic, astringent, and blood builder in folk medicine

5. Stinging nettle (*Urtica dioica* L.) has been used for hundreds of years to treat rheumatism, arthritis, gout, eczema, urinary tract infections, kidney stones, and early stages of an enlarged prostate (called benign prostatic hyperplasia [BPH])[33,34]
6. The decoction of dried leaves is used as a diuretic, astringent, emmenagogue, and anthelmintic.[7]

Pharmacological Studies

Anti-inflammatory effect

Research suggests that nettle's anti-inflammatory actions are attributed to its ability to interrupt the production and actions of inflammation-producing immune cells such as cytokines, prostaglandins, and leukotrienes in the body.[44] Recent laboratory studies and clinical studies on antirheumatic activity on stinging nettle showed possible antiarthritic activity.[33,34]

Antioxidant activity

An *in vitro* antioxidant study of *Urtica dioica* L. was performed using hydroalcoholic extract. In this study, *Anjura* extract showed an IC50 value of 88.33 ± 2.88 µg/ml in comparison to standard ascorbic acid which showed an IC50 value of 2.8 ± 0.62 µg/ml.[9]

Benign prostatic hyperplasia

A clinical study suggests that the root of the stinging nettle in combination with other herbs, especially saw palmetto, may be an effective treatment for BPH, relieving urinary symptoms such as reduced urinary flow, incomplete emptying of the bladder, posturination dripping, and the constant urge to urinate.[50]

Hypoglycemic effects

In an experimental study done on male Wistar rats, nettle has been shown to have hypoglycemic effects. In this study, the hydroalcoholic extract of *Anjura* (*Urtica dioica* L.) at 100 and 200 mg/kg showed significant antidiabetic effects against fructose-induced diabetic rats.[45] Oliver Bever and Zahland reported that a component present in *U. dioica* L. namely urticin is responsible for lowering the blood sugar concentration in hyperglycemic rabbits.[46]

Hepatoprotective effects

Türkdoğan *et al.*[47] and Kanter *et al.*[48] reported the hepatoprotective effects of *Nigella sativa* L. and *Anjura* (*Urtica dioica* L.). In carbon tetrachloride-induced liver fibrosis and cirrhosis model, *Nigella sativa* L. and *Urtica dioica* L. seem to be significantly effective in the prevention of carbon tetrachloride-induced hepatotoxicity in rats.[47,48]

Antioxidant, antimicrobial, antiulcer, and analgesic activities

The aqueous extract of *Anjura* (*Urtica dioica* L.) was studied for its antioxidant, antiulcer, and analgesic properties against ethanol-induced ulcerogenesis and analgesic effect on acetic acid-induced stretching. The aqueous and ethanolic extracts of *Urtica dioica* L. exhibited antimicrobial activity against nine microorganisms such as Salmonella spp., *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Proteus* spp., and *Escherichia coli*.[49]

Hypotensive effects

Testai *et al.* (2002) reported that *Urtica dioica* L. roots extract has hypotensive effects by decreasing vascular pressure. The study showed a marked but transient, hypotensive activity on the blood pressure of anesthetized rats. It is concluded that *Anjura* (*Urtica dioica* L.) can produce hypotensive responses, through a vasorelaxant effect mediated by the release of endothelial nitric oxide and the opening of potassium channels and through a negative inotropic action.[51]

Conclusion

Tukhm-i-Anjura, derived from *Urtica dioica* L. of the *Urticaceae* family, holds significant medicinal value in Unani Medicine. Its extensive use, documented by eminent Unani scholars, highlights its therapeutic applications for a variety of ailments, including renal stones, apoplexy, coma, vesicle stones, uvulitis, paralysis, epistaxis, boils and abscesses, asthma, breathlessness, rheumatism, arthritis, gout, eczema, urinary tract infections, and early stages of an enlarged prostate. Phytochemical studies reveal that the seeds, leaves, and rhizomes of *Urtica dioica* L. are rich in phenolic compounds, vitamins, minerals, amino acids, and agglutinin, a series of long-chain amino acid linkages. These historical and contemporary insights affirm the plant's multifaceted medicinal benefits, validating its role in treating a diverse range of conditions and enhancing its status as a valuable therapeutic agent in Unani Medicine.

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Conflicts of interest

There are no conflicts of interest.

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Review Article

Unraveling the Therapeutic Potential of *Suddāb* (*Ruta graveolens* L.) in Metabolic Disorders

Abstract

Metabolic disorders have been recognized as the most challenging clinical conditions worldwide leading to high morbidity and mortality. *Suddāb*, a plant medicine, has been used in the treatment of metabolic disorders in Unani medicine for hundreds of years. This study aimed to review botanical descriptions, ethnomedicinal uses, pharmacology, phytochemistry, and toxicity of *Suddāb*. This article focused on exploring the therapeutic potential of *Suddāb* in the treatment of metabolic diseases. This study was a narrative review based on a literature search of classical textbooks and original and review articles published between 2000 and 2022. Unani classical literature such as *Muheet e Azam*, *Makhzan-ul-Mufradat*, *Al-Jam-e-ul-Mufradat-Al-Advia-Wal-Aghziya*, *Khazainu lAdvia*, *Mufradat Azeezi*, *Alqanoon fil-Tib*, *Rumooz-e-Azam*, and *Kitab-ul-Moatamad fil Advia Al Mufreda* (Arabic) and online bibliographic databases such as Medline (via PubMed), Google Scholar, Science Direct, Web of Science, and Scopus were searched. In this study, 18 classical Unani books, 21 original research articles, and 19 review articles were reviewed. It has been found that famous Unani scholars like Hippocrates and Dioscorides have documented the medicinal use of *Suddāb* in their books. In Unani medicine, *Suddāb* has been used for the treatment of metabolic disorders such as *Waja' al-Mafāṣil* (polyarthritis), *Ḥudār* (rheumatism), *Siman Mufrit* (obesity), and *Niqris* (gout). Moreover, it has been reported that *Suddāb* possesses numerous pharmacological activities such as antihyperlipidemic, antihyperglycemic, antihyperuricemic, analgesic, anti-inflammatory, and antioxidant. This review concluded that *Suddāb* is a potential plant-based drug for the treatment of metabolic disorders. It is suggested that the bioactive phytoconstituents of *Suddāb* may be studied for their therapeutic potential in metabolic disorders.

Keywords: *Gout, Ḥudār, Niqris, obesity, rheumatism, Siman Mufrit*

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Introduction

Metabolic disorders have been recognized as the most challenging clinical conditions worldwide leading to high morbidity and mortality. The rising incidence and prevalence of metabolic disorders such as diabetes mellitus type 2, nonalcoholic fatty liver disease, and obesity have become a concern for the exchequer, healthcare providers, and policymakers.[1] A recent study has shown that 15.3%, 35.5% 39.5%, 81.2 %, and 28.6% of the Indian population are suffering from prediabetes, hypertension, abdominal obesity, dyslipidemia, and overall obesity, respectively.[2] The incidence of diabetes is stabilizing as the epidemic of noncommunicable disease (NCD) in most of the states of India.[2] These metabolic disorders are potential risk factors for cardiovascular disorders and long-term organ complications.[2] Lifestyle changes and unhealthy diets have been found to play a significant role in the occurrence of these NCDs.[2] The lack of a complete cure, lifelong management, high cost of treatment, and life-threatening complications of these metabolic disorders have drawn the attention of scientists, academia, and policymakers to find out their complete remedies.

Unani medicine has been treating these metabolic disorders through pharmacological and nonpharmacological therapies for hundreds of years. Unani pharmacopeia contains many plant-based or herbal–mineral medicines for the treatment of dyslipidemia, diabetes, hypertension, and obesity. In the literature search, we found that *Suddāb* (*Ruta graveolens* L) is one of the medicines that could potentially treat metabolic disorders. *Suddāb* is an aromatic perennial plant of the Rutaceae family cultivated worldwide.[3] In Unani medicine, its various parts such as *Barg-i-*

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Suddāb (leaves) and *Tukhm-i-Suddāb* (seeds) are used as medicine.[4-6]

In Unani medicine, *Suddāb* has been used for the treatment of *Waja'al-Mafāṣil* (Polyarthritis), *Ḥudār* (Rheumatism), *Ihtibās al-Tamth* (Amenorrhoea), *Fālij* (Hemiplegia), *Siman Mufrit* (Obesity) and *Niqris* (Gout).[4-6] Moreover, it has been reported that *Suddāb* possesses numerous pharmacological activities such as antihyperlipidemic, antihyperglycemic, antihyperuricemic, analgesic, anti-inflammatory, and antioxidant. Phytochemical studies have been extensively conducted in the recent past to obtain the phytochemical profile of *Suddāb*. So far, 231 chemical compounds have been found in this plant including alkaloids (acridone, quinolones, and quinolines), phenylpropyl (simple phenylpropyl and furanocoumarins), flavonoids, steroids, anthraquinones, volatile oils, and other active components.[3,7]

In this review, we aimed to highlight the botanical characteristics, ethnomedicinal uses, pharmacological actions, bioactive compounds, and toxicity of *Suddāb*. This study focused to explore the therapeutic potential of *Suddāb* to treat metabolic disorders. Scientists and research scholars may utilize the information for the development of future perspectives of this plant in the prevention and treatment of metabolic disorders.

Methodology

This is a narrative review article. Unani classical literature such as *Muheet e Azam*, *Makhzan-ul-Mufradat*, *Al-Jam-e-ul-Mufradat-Al-Advia-Wal-Aghziya*, *Khazainul Advia*, *Mufradat Azeezi*, *Alqanoon fil-Tib*, *Rumooz-e-Azam*, and *Kitab-ul-Moatamad fil Advia Al Mufreda* (Arabic) were manually searched in the central library of National Research Institute of Unani Medicine for Skin Disorders, Hyderabad. We also searched online bibliographic databases such as Medline (via PubMed), Google Scholar, Science Direct, Web of Science, and Scopus. The keywords such as "*Ruta graveolens*" OR/AND "*Suddāb*" OR/AND "Metabolic disorders" were used to screen the relevant published articles. The publication year (2000–2022) and article type (review article and clinical trials) were used to filter the articles. Standard Unani Medical Terminology published by Central Council for Research in Unani Medicine, New Delhi was referred to describe the Unani terminologies.

Results

In this study, 18 classical Unani books, 21 original research articles, and 19 review articles were reviewed. It has been found that famous Unani scholars like Hippocrates and Dioscorides have documented the medicinal use of *Suddāb* in their books.[7] *Suddāb* is a small evergreen subshrub and is known for its aromatic and medicinal properties.[8] The word *graveolens* is a Latin word which means strong smelling. The leaves of this plant contain a strong unpleasant odor; hence, this plant is called *R. graveolens*.[3] Classical Unani literature describes three varieties of *Suddāb* used to treat various clinical conditions. They are known as *Bustānī Suddāb*, *Jangli Suddāb*, and *Pahadi Suddāb*. Of them, *Bustānī Suddāb* has been considered the best plant variety in terms of medicinal potential.[4-6] It has been used for the treatment of *Siman Mufrit* (Obesity) and rheumatological diseases such as *Waja' al-Mafāṣil* (Polyarthritis), *Ḥudār* (Rheumatism), and *Niqris* (Gout).[4-6]

Suddāb has been reported for numerous pharmacological activities such as antihyperlipidemic, antihyperglycemic, antihyperuricemic, analgesic, anti-inflammatory, and antioxidant. The leaves of the *Suddāb* are a rich source of bioactive secondary metabolites mainly alkaloids, flavonoids, resins, saponins, steroids, coumarins, and essential oils.[7] *Suddāb* contains quinoline alkaloids (graveoline and graveolinine), acridone alkaloids (furacridone and gravacridone), furoquinoline dictamnine, coumarins, such as gravelliferone, isorutarin, rutacultin, rutaretin, suberenone, furanocoumarins 5-methoxypsoralen (bergapten), and 8-methoxypsoralen (xanthotoxine).[8]

Vernaculars

Suddāb has been found in different parts of the world and is used as traditional medicine such as Chinese medicine and Persian medicine for various therapeutic purposes.[3] It is known in different geographical regions by its different local names.

- Arabic: *Suddāb* or Sadab, Zafri[9-13]
- Unani: Faijan, Safayenafayen,Tartafish, Qaikhafiyoon[9,10,14]
- English: Garden Rue[11,12,14,15]
- Hindi: Sanol, Satari, Sadamat[9,10,13,14]
- Telugu: Sadapaka[12,16]
- Bengali: Ispand, Ermul,Titli[9-11,13,14]
- Gujarati: Satap, Sadab[12,13,16]
- Sindhi: Sada[9,10]
- Sanskrit: Sadapaha, Somalata[16]
- Tamil: Aruvada[12,16,17]
- Romi: Fayaalis, Faighanoon, Tinkabani[9,10]
- Persia:
- *Suddāb*[12,13]
- Marathi: Arud, Satap.[13]

Botanical characteristics

Suddāb is a herbaceous perennial strong-smelling plant and a member of the family Rutaceae. Figure 1 displays the image of Ruta graveolens. It is a native plant to the Mediterranean region and it is cultivated all over India, North, Central, and South America, China, Middle East, and South Africa as a medicinal and ornamental herb.[15,17-20] It may grow up to 1 m or 80 cm in height.[15] It grows well in chalky soil and sunny borders.[21] Its leaves are alternate with 2–3 pinnates, linear–oval leaflets, oblanceolate

in shape, spathulate, blue-green in color, and strongly aromatic in odor.[12,22,23] Numerous, small, yellowish-green flower, with strong aroma, is the characteristic feature of this plant.[15,21] The flowers are triangular with 4–5 concave tooth petals. The sepals are triangular.[12,22] It appears in mid-summer.[20] The seeds are kidney-shaped, dark brown or green in color. Figure 2 shows the seeds of Ruta graveolens. The taste of the seed is pungent and odor is aromatic. The microscopic features of the seed consist of rectangular to squarish large cells in the outer epidermis. A thin-walled elongated parenchymatous cell is present beneath the epidermis. The single-layered rectangular cell is mainly present in the outer layer of cotyledon. The cotyledon contains aleurone grains in oval to round shapes.[24] It bears brown greenish fruit capsule containing 4–5 lobed at the top with numerous seeds.[19,22,23] The stem may grow up to a height of one meter and it is smooth, slender, and pale glaucous green.[23] The stems become woody near the base, but remain herbaceous nearer the tips.[20]

Mizāj (Temperament)

Mizāj is one of the fundamental principles of Unani medicine that is in used to assess the individual's quality of health or condition as well as to find out drugs that can treat unhealthy conditions.[25] The drugs have a temperament, too. The temperament of the drug is used as a tool to assess its medicinal properties, therapeutic actions, and adverse effects. The Unani physicians have categorized the temperament of drugs into four groups. It can be hot, cold, moist, or dry and the temperament of a drug is graded into four degrees as per the intensity of their action.[26] There is variability in the temperament of *Suddāb* in the literature. The temperament of moist *Bustānī Suddāb* is hot and dry in the second degree.[11,27,28] But *Jalinoos* and *Ibn-i-Baitar* mentioned its temperament as hot and dry in the third degree. The dry *Bustānī Suddāb* is hot and dry in the third degree. But the dry *Jungli Suddāb* is hot and dry in the fourth degree.[28-31] Whereas, the temperament of *Tukhm-i-Suddāb* is hot and dry in the third degree and *Roghan-i-Suddāb* is hot and dry.[28]

Therapeutic actions anduses

Unani literature describes the actions and medicinal uses of *Suddāb* in various clinical conditions. It has been found that *Suddāb* is used for the treatment of digestive, respiratory, neurological, gynecological, dermatological, and reproductive diseases. Unani physicians use *Suddāb* in different dosage forms for clinical use. Table 1 displays various actions of *Suddāb* observed in various dosage forms for different diseases.

Ethno-medicinal uses

Suddāb has been found to possess potential medicinal value. *Suddāb* has been indicated for the treatment of *Waja'al-Mafāṣil* (Polyarthritis), *Ḥudār* (Rheumatism), *Iḥtibās al-Ṭamth* (Amenorrhoea), *Fālij* (Hemiplegia), *Siman Mufriṭ* (Obesity) and *Niqris* (Gout).[4-6] In addition, *Roghan-i-Suddāb* (Rue oil) obtained from the leaves of the *Suddāb* plant is also used for therapeutic purposes.[18] The following clinical uses of *Suddāb* in various diseases are documented in the authentic classical textbooks.

- *Barg-e-Suddāb* 4 g powder with lukewarm water is effective in dribbling of urine[28]
- The solution of *Barg-i-Suddāb* with *Sirka* is effective in epilepsy[10]
- Solution of 105 mL *Barg-i-Suddāb* with 70 mL honey is effective in dermatophytosis[9,30]
- A solution of powder of *Tukhm-i-Suddāb* mixed with honey is effective in nightmares, epilepsy, hemiplegia, tremor, hiccough, dyspepsia, and polyarthritis[11,34]
- External application of paste made from powder of *Barg-i-Suddāb*, Honey, *Roghan-i-Gul*, *Sirka* and *Safeda* is quite effective in baldness[28]
- External application of a mixture of powder of *Barg-e-Suddāb* with *Shib-e-Yamani* is effective in dermatophytosis[9,30]
- External application of a mixture of powder of *Barg-i-Suddāb* with *Roghan-i-morid* and *Mom* is beneficial in eruptions[9]
- External application of a paste made from the extract of *Barg-i-Suddāb* with *Sirka*, *Safeda*, and *Roghan-i-Gul* in herpes and carbuncle[9,14,28,30]
- External application of *Roghan-i-Suddāb* or a mixture of *Roghan-i-Suddāb* with honey is effective in polyarthritis and rheumatism.[10,15]

Dosage

The dosage of *Suddāb* varies from 3 g to 5 g and it can be advised up to 10.5 g depending upon the patient's age, temperament, and severity of disease. In children, the dose of *Suddāb* is 250 mg to 1 g.[9,10,32] *Tukhm-i-Suddāb* is used up to a dose of 7 g. It can be used in the form of decoction and powder administered orally, fumigation for inhalation, while its volatile oil, paste or ointment applied locally.

Adverse effects, allergenic reactions and toxicity

Unani literature describes that the prolonged oral use of *Suddāb* can cause *Ṣudā'* (headache) and *Ḍu'f al-Bāh* (anaphrodisia/ loss of libido). It may also be harmful to the *Qalb* (heart) in the individual with a hot temperament. It is contraindicated in individuals having brain and liver with hot temperament.[11,13] On inhalation, it may produce nausea.[9] It is an active irritant whether applied externally or taken internally; sometimes it produces painful vomiting, always great prostration, confusion of mind, cloudy vision, feebleness and slowness of pulse, coldness of extremities, and twitching of the limbs.[35,36] It has been reported that photodermatitis after exposure to sunlight in a patient of fibromyalgia following the application of an infusion of *Suddāb*.[37]

Table 1: Indications, actions, and dosage forms of *Suddāb*

Indications	Actions	Part used/dosage form	Reference
Siman Mufriṭ (obesity)	*Mulaṭṭif* (demulcent) *Mujaffif* (desiccant) *Mudirr-i-Bawl* (diuretic) *Musakhkhin* (calorific)	Seeds/*Safūf* (powder)	[5]
Qūlanj Rīḥī (colic due to flatulence)	*Kāsir-i-Riyāḥ* (carminative)	Leaves/*Joshānda* (decoction) Seeds/*Safūf* (powder) Rue oil/*Ḥuqna* (enema)	[9,10,14,16,17,21,22,28,31]
Nafkh al-Mi'da (flatulence)	*Kāsir-i-Riyāḥ* (carminative)	Leaves/*Joshānda* (decoction)	[12,31]
Ḥuṣr (constipation)	*Muḥarrik-i-A'ṣāb* (stimulants) *Mulaṭṭif* (demulcent)	Leaves/*Joshānda* (decoction)	[9]
Waja' al-Mi'da Riyāḥī (abdominal pain)	*Kāsir-i-Riyāḥ* (carminative)		
Taqṭīr al-Bawl (dribbling of urine)	*Mufattiḥ* (deobstruent)	Leaves/*Safūf* (powder)	[28]
Fuwāq (hiccough)	*Kāsir-i-Riyāḥ* (carminative), *Muḥallil* (resolvent)	Leaves/*Joshānda* (decoction) Seeds/*Safūf* (powder)	[9,28-30]
Ṣar' (epilepsy)	*Mufattiḥ* (deobstruent)	Leaves/*Sa'ūṭ* (nasal drop) Seeds/*Safūf* (powder)	[3,28,30]
Ru'āf (epistaxis)	*Mujaffif* (desiccant)	Leaves/*Dharūr* (dusting powder) Extract of leaves/*Sa'ūṭ* (nasal drop)	[9,11,13,28-30]
Waram al-Khuṣyatayn (orchitis)	*Muḥallil* (resolvent), *Mujaffif* (desiccant)	Leaves/*Ṭilā* (liniment)	[28,30]
Ṣala' (baldness)	*Mukharrish* (irritant)	Leaves/*Ṭilā* (liniment)	[28]
Nazla-o-Zukām (coryza and catarrh)	*Muḥallil* (resolvent)	Leaves/*Dhūnī* (fumigation)	[7,12,17]
Iltihāb al-Shu'ab (bronchitis)			
'Usr al-Tanaffus (dyspnoea)	*Muḥallil* (resolvent)	Leaves/*Joshānda* (decoction)	[9,10]
Dhāt al-Ri'a (pneumonia)			
Mukhrij-i-Janīn (abortifacient)	*Mukharrish* (irritant)	Leaves/*Ḥamūl* (pessary), *Dhūnī* (fumigation), *Joshānda* (decoction) Seeds/*Ḥamūl* (pessary)	[9,14,28]
Fasād al-Haḍm (dyspepsia)	*Kāsir-i-Riyāḥ* (carminative)	Leaves and seeds/*Safūf* (powder)	[10-12,14,16,28,30]
Qūbā (ringworm)	*Mukharrish* (irritant), *Mulaṭṭif* (demulcent)	Leaves/*Ṭilā* (liniment) and *Joshānda* (decoction) Resin/*Ṭilā* (liniment)	[9,28,30]
Buthūr (eruptions)	*Mulaṭṭif* (demulcent), *Mujaffif* (desiccant)	Leaves/*Ṭilā* (liniment)	[9]
Ṣudā' (headache)	*Muḥallil* (resolvent), *Mufattiḥ* (deobstruent)	Leaves/*Ḍimād* (paste) and *Sa'ūṭ* (nasal drop) Rue oil/*Qat'ur*	[9,29,30]
Zaḥīr (dysentery)	Tiryāq (antidote), *Kāsir-i-Riyāḥ* (carminative)	Leaves/*Joshānda* (Decoction)	[29]
Istisqā' Laḥmī (anasarca)	*Mujaffif* (desiccant), *Musakhkhin* (calorific)	Leaves/*Ḍimād* (paste)	[10,14,30,32]
Namla (herpes)	*Mujaffif* (desiccant)	Extract of leaves/Latukh (paste)	[14,28,30]
Jamra (carbuncle)			
Ṭanīn-o-Dawī (tinnitus)	*Muḥallil* (resolvent)	Extract of leaves/*Qat'ur* (ear drop)	[33]
Waja'al- Udhun (otalgia)	*Muḥallil* (resolvent)	Extract of leaves/*Qat'ur* (ear drop)	[9,10,30]
Ṭarash (deafness)	*Mulaṭṭif* (demulcent), *Musakhkhin* (calorific)	Rue oil/*Qat'ur* (ear drop)	[9,28]
Kābūs (nightmare)	*Kāsir-i-Riyāḥ* (carminative), *Mukharrish* (irritant)	Extract of leaves/*Sa'ūṭ* (nasal drop) Seeds/*Safūf* (powder)	[9-11,28,30]
Fālij (hemiplegia)	*Mufattiḥ* (deobstruent)	Seeds/*Safūf* (powder)	[9-11,28,30]
Ra'sha (tremor)		Resin/*Ma'jūn*	

Contd...

Table 1: Contd...

Indications	Actions	Part used/dosage form	Reference
Waja' al-Mafāṣil (polyarthritis)	*Muḥallil* (resolvent)	Rue oil/*Roghan* (oil)	[15,28]
Ḥudār (rheumatism)			
Niqris (gout)	*Muḥallil* (resolvent)	Seeds/*Safūf* (powder)	[10,28,29]
'Irq al-Nasā (sciatica)			
Fād-i-Zahr (antidote to scorpion stings or snake bite)	*Tiryāq* (antidote of poison)	Seeds/*Ḍimād* (paste), *Safūf* (powder)	[9,12,14,17,29]
Bahaq Abyaḍ (pitryasis alba), *Tha'ālīl* (warts)	*Muḥammir* (rubefacient), *Muḥallil* (resolvent)	Resin/*Ṭilā* (liniment)	[19,28]
Qurūḥ al-'Ayn (ulcer of eye)	*Mujaffif* (desiccant)	Resin/*Dharūr* (dusting powder)	[9]
Qurūḥal-Raḥim (uterine ulceration)			
Ikhtināq al-Raḥim (hysteria)	*Muḥallil* (resolvent), *Mulaṭṭif* (demulcent)	Resin/*Lat'ukh* (paste)	[10,34]
Iḥtibās al-Ṭamth (amenorrhoea)	*Mukharrish* (irritant), *Mujaffif* (desiccant)	Rue oil/*Ḥamūl* (pessary)	[16,28]
Dā'al-Tha'lab (alopecia areata)	*Mukharrish* (irritant)	Bark/*Ṭilā* (liniment)	[17,21]
	Mulaṭṭif (demulcent)		

Substitute and correctives

Unani literature states that there are substitutes (drugs that have similar medicinal properties) for *Suddāb*. For example, *Pudina* (*Mentha arvensis* Linn.) and *Satar Farsi* (*Satureja hortensis* L.) may be used as substitutes for *Suddāb*. Moreover, *Barg-i-Suddāb* can be used as an alternative to *Tukhm-i-Suddāb*.[28,38]

The adverse effects of *Suddāb* can be minimized by the use of corrective e.g. *Khurfa* (*Portulaca oleracea* Linn.). *Ṣudā'* (headache) and *Shaqīqa* (migraine) can be prevented by the use of *Sikanjabīn* (a liquid preparation made of honey and vinegar). Moreover, *Jalinoos* (Galen) advocated that an adverse effect of *Ḍu' f al-Bāh* (loss of libido) can be avoided with the use of *Anisoon* (*Pimpinella anisum* L).[27,28,33]

Adulteration

Adulteration is common in plant medicine. In the local market sample, *Suddāb* is generally adulterated with *Euphorbia dracunculoides*. But *Suddāb* can be identified by strong-smelling ethereal oils in its leaves which are slightly toxic and bitter. The bruised leaves have a pleasant orange-like fragrance. Morphological characteristics of *R. graveolens* and *E. dracunculoides* are more or less similar, and difficult to discriminate morphologically under the naked eye.[39] However, there are molecular markers available which can be used for the authentication of herbal drugs. For example, RAPD has simplicity in practical exercise and low experimental cost as well. This method has already been used for a number of medicinal plant species to discriminate from their morphologically allied and geographically co-occurring species or adulterants.[40,41] *R. graveolens* was earlier authenticated from its adulterant *E. dracunculoides* based on unique bands using the RAPD marker.[41]

Phytochemistry

The leaves of the *Suddāb* are a rich source of bioactive secondary metabolites mainly alkaloids, flavonoids, resins, carbohydrates, glycosides, saponins, steroids, coumarins, volatile oils, and fixed oil. The constituents are 2% rutin, psoralen, bergaptin, graveoline, and naphthoharniarinan drutarin. The 2% rutin is the main active flavonoidal glycoside having various pharmacological activities.[42-45] The essential oil derived from fruits, flowers, roots, leaves, or stems of *Suddāb* by steam distillation is mainly composed of oxygenated compounds like ketones, alcohols, and acetates.[46,47] Pure rue oil consists of 90% of methylnonylketone.[21] More than 231 different phytochemical compounds from root and aerial parts of *Suddāb* have been isolated and identified from species.[5] The main bioactive compounds found in *Suddāb* are listed in Table 2.

Pharmacological Activities

Suddāb has been extensively researched to explore its pharmacological activities. Literature search has shown that several *in vitro* and *in vivo* studies were conducted in the past. Table 3 displays the various pharmacological activities of *Suddāb* reported in the literature. Extracts in various concentrations obtained from different parts of the plant were used in the experimental studies to observe their safety and efficacy. *Suddāb* showed antihyperlipidemic, antihyperglycemic, antihyperuricemic, immunomodulatory, nephroprotective, and antioxidant activities in animal models.

Future perspectives

In this study, it has been found that *Suddāb* is a plant medicine used in Unani and other traditional medicines for the treatment of gastrointestinal, reproductive, neurological, and metabolic disorders for a long time. *Suddāb* has been

Table 2: List of chemical compounds and formulations of *Suddāb*

Parts of the plant	Chemical compound	Formulations	Reference
Seeds	Saponins, tannins, flavonoid, alkaloids, terpenoids, carotinoide	*Ma'jūn Boolis* *Ma'jūn Mughalliz Jawaharwali*	[48-50]
Aerial parts	Flavonoids, essential oils	*Anqaruya-i-Kabir* *Shiyāf-i-Siql-i-Samat* *Ma'jūn-i-Masihi* *Ḍimād-i-Ushaq Tehali* *Tiryāq-i-Aqrab* *Roghan-i-Jund*	[18,49,51,52]
Leaves	Alkaloids, saponins, flavonoids, tannins, terpenoid, anthraquinones, glycosides, coumrins, phenols, steroid, terpenoid, anthraquinones	*Jawārish Kamooni* *Ḍimād-e-Kibreet* *Ḍimād-e-Tehal, Roghan-e-Seer,Roghan-e-Suddāb* *Jawārish-e-Kamooni Kabir* *Qurṣ-e-Mur* *Jawārish Pudina Wilayti* *Aujaia* *Qurṣ-e-Musakkin* *Safūf Muhazzil* *Safūf Satar Murakkab*	[18,44,49,50,52,53]

Figure 1: *Suddāb* (*Ruta graveolens* L)

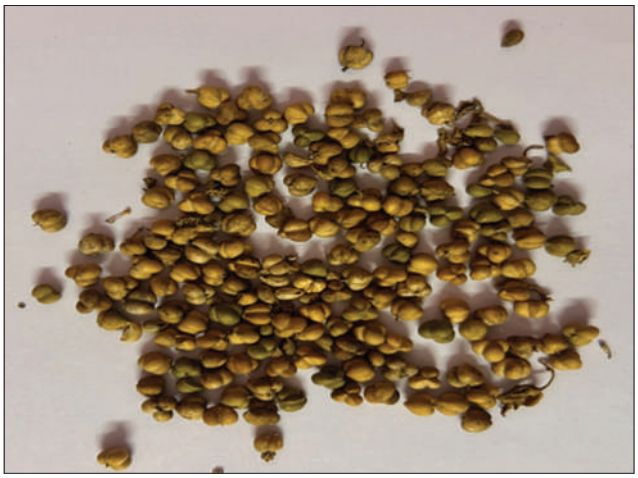

Figure 2: *Tukhm-i-Suddāb* (Seeds of *Ruta graveolens* L)

studied in various *in vitro* and *in vivo* preclinical settings for its safety and efficacy. Although *Suddāb* has shown antihyperlipidemic, antihyperglycemic, antihyperuricemia, immunomodulatory, nephroprotective, and antioxidant activities in experimental studies, but very few clinical trials have been conducted to test its safety and efficacy in human participants. In a clinical trial, *Tukhm-i-Suddāb* showed significant results in *salabat-e-nabz* (atherosclerosis).[65] The current rising incidence of metabolic disorders has drawn the attention of researchers to develop a potential medicine for their treatment. The presence of numerous bioactive compounds in this plant also stimulates to study their potential in treating metabolic disorders.

Conclusion

This study reviewed the ethnomedicinal uses, pharmacology, phytochemistry, and toxicity of *Suddāb* focussing on exploring the therapeutic potential of *Suddāb* in the treatment of metabolic diseases. It has been found that *Suddāb* is an aromatic and medicinal plant used in Unani, Ayurveda, Siddha, and Chinese medicines for the treatment of obesity (*siman-e-mufriṭ*), dyslipidaemia (*fart-e-tadassum fi'l dam*), and atherosclerosis (*ṣalābat-e-nabz*). Several *in vitro* and *in vivo* preclinical studies showed the pharmacological activities which validate its use in metabolic disorders. The current knowledge about the phytochemicals in *Suddāb* advocates that they should be extensively studied to explore their therapeutic potential in metabolic disorders.

Table 3: Pharmacological activities of *Suddāb*

Pharmacological activity	Plant part used	Dosage form and dose	Model used	Outcome	Reference
Anti-inflammatory analgesic	Aerial part	Ethanolic extract - 20 mg/kg Methanolic extract - 50 mg/kg	Carrageenan-induced rat paw edema	The less percentage of inhibition as compared to the standard drug Voveran At dose of 50 mg/kg The effect was significantly (P<0.05) higher than that of the standard drug	[53]
Antihyperlipidemic and antihyperglycemic	Leaves	Water extract - 125 mg/kg b.w. Alcholic extract - 10, 20, and 30 mg/kg b.w.	White male albino rats Adult male Wistar rats	Showed blood glucose and cholesterol decreased significantly Significant decrease in the level of cholesterol and LDL-c	[54,55]
Antihyperuricemia	Aerial part	Ethanolic extract - 0.25 mg/kg	Adult male Wistar rats	Significantly reduced the level of blood urea as compared to standard drug	[48]
Antiandrogenic	Whole plant	Aqueous extracts - 500 mg/kg b.w.	Male albino rats	Significant decrease in the weight of reproductive organs, sperm motility, and spermatogenesis activity	[56]
Antimicrobial and cytotoxic	Aerial parts	Methanol extract	-	Showed no activity against the Gram-negative microorganism and fungus candida albicans but exhibited inhibitory effect towards Gram-positive microorganism	[57]
Antifertility and anti-conceptive	Leaves	Ethanol extracts - 20 mg/day	Adult male Wistar rats	Significant reduction in number of sperms	[58]
Immunomodulatory	Leaves	Alcoholic extract - 50–200 mg/kg b.w.	Wister albino rats	Significant stimulation of the cell-mediated immunity as well as humoral immunity Significant stimulation of the cell-mediated immunity as well as humoral immunity	[59]
Antidiarrhoeal	Leaves, stem	Ethanolic extract - 50–300 mg/kg b.w.	Wister albino rats	Significant reduction in the incident and severity of diarrhoea	[60]
Anticonvulsant	Leaves	Methanol extract - 1 mL/100 g	Male albino mice	Leaf methanol extract has anticonvulsant activity which may be by enhancement of GABA neurotransmission	[61]
Relaxant	Leaves and aerial parts	Ethanol/water (4:1) - 1 mL/100 g	Dawley rats	Study showed that airway smooth muscle contraction induced by KCL and carbachol markedly reduced by *Ruta graveolens*	[62]
Nephroprotective	Leaves	80% aqueous ethanol Extract - 50 mg/kg	Male wistar rats	Showed nephroprotective effect against DEN-induced renal toxicity in rats	[35]
Antimicrobial	Root	Crude extract	Agar diffusion method	Found to be effective against the tested pathogenic microbes Found to be effective against the tested pathogenic microbes	[63]
Antibacterial	Leaves	Ethanol, methanol, chloroform extract	Disc diffusion method	Chloroform and methanol extracts showed more antibacterial activity than ethanol	[64]
Antioxidant	Aerial parts	Ethanolic extract	DPPH method	Positive antioxidant activity as compared with standard quercetin	[33]

LDL-c: Low-density lipoprotein cholesterol, KCL: Potassium chloride, DEN: Diethylnitrosamine, DPPH: 1,1-diphenyl-2-picrylhydrazyl

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Conflicts of interest

There are no conflicts of interest.

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Review Article

An Appraisal of *Sharbat-i-Nazla*: A Liquid Dosage Form of Unani Medicine for Respiratory Ailments

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Abstract

Sharbat is a liquid dosage form in unani system of medicine in which the infusion, decoction, or juice of drugs is boiled in a recommended sweetener such as sugar, honey, jaggery etc. till the required consistency. *Sharbat-i-Nazla* is unani pharmacopeial formulation included in the National Formulary of Unani Medicine. It consists of thirteen herbal drugs which are widely recommended for the treatment of cold, cough, and catarrh. In this review, we attempted to explore the pharmacological actions of its constituent ingredients as described in Unani literature, and the scientific evidence for the actions. It was observed that the ingredients of *Sharbat-i-Nazla* exhibit important pharmacological actions such as anti-inflammatory, anti-viral, anti-bacterial, sedative, cough suppressant, bronchodilatory, and anti-thrombotic which are imperative to the management of respiratory infections. Since all pharmacological actions are attributed to specific phytoconstituents, it adds to the credibility of the formulation. Hence, it is hypothesized that *Sharbat-i-Nazla* may be a potentially beneficial and safe formulation for use in respiratory infections, including emerging diseases.

Keywords: *Anti-inflammatory, catarrh, cough, respiratory, Sharbat-i-Nazla*

Introduction

According to the "*Dictionary of English Etymology*" published in 1865, the word "*Sherbet*" or "*Sharbat*" is an Arabic word which literally means a "drink," "sip," "syrup," or "dose of medicine." The Italian equivalent of the term is "*sorbetto*," which means "any kind of thin sipping broth," and also refers to a kind of Turkish drink made of lemons, sugar, almonds, amber, and musk. The root word of the Arabic term *Sharbat* is "*shrub*" or "*sharb*," the equivalent of *sorbere* (Latin), and *sorbire* (Italian).[1] Presently, in Unani medicine, the term "*Sharbat*" is used for formulations which are prepared with the infusion, decoction, or juice of drugs by mixing them with sugar, honey, or jaggery and boiling to the required consistency.[2] According to Hakeem Kabiruddin, the origin of *Sharbat* is in antiquity and is mostly attributed to the ancient Greek philosopher Pythagoras (ca.570 - ca.495 BC).[3]

Inherently, it appears that *sharbat* was invented just as a means of improving the palatability of drugs and to preserve them for a required period of time. With researches, it is becoming increasingly clear that the saccharide-based sweeteners used in *sharbat* are not merely employed as a preservative but also play a crucial role in the assimilation and absorption of the constituents. Furthermore, the presence of sugars in the formulation enables the breakdown of complex substances and causes the lysis of plant cell-wall, thereby adding the beneficial substances from it, which would not have been available if the herbs were digested directly in the human body. Thus, the addition of sugars in *sharbat* acts as a solvent and increases the bioavailability and bioactivity of the constituents in the formulation.[4] There is also evidence to suggest that the presence of sugars may increase the anti-oxidant and anti-inflammatory activity of the formulation.[5]

General method of preparation of *Sharbat*

The general preparation method of preparation of *Sharbat* is as follows:

- The juicy fruits such as pomegranate, grapes etc. should be squeezed and the juice extracted. The juice is then mixed with the recommended sweetener two or three times the weight of the juice, and then *qiwām* (consistency/base) is prepared as per the desired consistency
- The dry-and-hard drugs are soaked in 8–10 times water overnight. Then,

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they are boiled in the morning till one-third of the water remains. After that, they are mashed lightly and strained. The strained fluid is mixed with twice or thrice the amount of recommended sweetener, and *qiwām* of the recommended consistency is prepared
- If the *sharbat* of such fruits has to be prepared, which yield less juice on pressing, they are processed in two ways. The sour fruits such as lemon and plum are soaked in water, mashed, and strained, and then *qiwām* is prepared per the recommended method. If the fruits are sweet, such as fig, they should be boiled in water, strained, and then *sharbat* is prepared as per guidelines
- In some *sharbat* prescriptions, drugs such as *Shīr Khisht* (*Fraxinus ornus* L.), honey, or *turanjabīn* (*Alhagi pseudalhagi* [M.Bieb.] Fisch.) are added while *qiwām* is being prepared. Such drugs should be first dissolved in water, decoction, or infusion and strained to remove any straws etc. before making the *qiwām*
- If the drugs to be added are insoluble in water, they should be finely powdered and then added to the *qiwām*.[2,3]

Qiwām (consistency)

In classical unani texts, the *qiwām* of *sharbat* is described to be of "*one tār*," i.e., "one string." This is determined as taking one drop of the *qiwām* between two fingers and separating them slightly. If one string of the syrup forms between the fingers, then the *qiwām* is described as "*one tār*." This viscosity of *qiwām* is recommended for *Sharbat*. When mucilaginous drugs are boiled while making *qiwām*, the presence of mucilage masks the real consistency. In this case, it should be carefully examined whether the *qiwām* is prepared or not.[3,6]

Storage

Sharbat should always be stored in clean and dry containers made of glass or porcelain and never in metallic containers. Care should be taken not to allow moisture or water into the vessel as it will spoil the *sharbat*. If prepared and stored per instructions, *sharbat* can be stored and used for 1 year.[2,3]

Sharbat-i-Nazla

Sharbat-i-Nazla is a unani pharmacopeial formulation recommended for the treatment of cold, catarrh, and cough. The recommended dose for adults is 20 mL twice a day. It contains 13 ingredients of herbal origins, besides sugar, for making the *qiwām* (base). The details of the formulation are provided in Table 1.

Therapeutic Activity of Ingredients and Scientific Validation

Gul-i-Banafsha (*Viola odorata* L.)

Ibn Hubal Baghdadi's statement

It is a cold (1st degree) and moist (2nd degree) drug. It is beneficial for headache, chest pain, and cough. Its *Murabba* (preserve) and *Sharbat* (syrup) are beneficial in pneumonia and pleurisy. The *Sharbat* relieves epigastric burning, renal colic, and also helps in the expulsion of *safra* through laxative action.[7]

Scientific evidence

Viola odorata polysaccharides (galactose, galacturonic acid, and glucose) exert anti-inflammatory activity, particularly in the exudative stage. The water-soluble polysaccharides have demonstrated protective action on alveoli against formalin-induced damage. Alkaloids, saponins, flavonoids, Vitamin C, and cyclotides have potent anti-bacterial, anti-fungal and anti-viral activity. A protein cycloviolacin O_2 has specific activity against *Mycobacterium tuberculosis*. *V. odorata* also has bronchodilator, anti-tussive, and anti-spasmodic action on the respiratory tract.[8]

Barg-i-Gāozabāṉ (*Borago officinalis* L.)

Ibn Sina's statement

Barg-i-Gāozabāṉ is anti-inflammatory and helps in relieving pediatric aphthous ulcers. It is beneficial in relieving palpitation, cough, and soothes the irritation of the respiratory tract.[9]

Scientific evidence

γ-linoleic acid and stearidonic acid (fatty acids) present in *Borago officinalis* have anti-inflammatory, anti-thrombotic, bronchodilator, vasodilator, and cardio-suppressant activity. The phenols present in *B. officinalis* act as anti-oxidants.[10] The flavonoids and sterols of *B. officinalis* have spasmolytic action on cardiac, respiratory, and intestinal tissues.[11] Rosmarinic acid, an ester present in *B. officinalis* has an anti-nociceptive activity.[12]

Tukhm-i-Khaṭmī (*Althaea officinalis* L.)

Ibn Baitar's statement

Khaṭmī is an anti-inflammatory, analgesic, and wound-healing drug. It is beneficial in relieving cough associated with hot temperament and effectively clears morbid humors from the lungs.[13]

Scientific evidence

A pectic polysaccharide Rhamnogalacturonan found in *Althaea officinalis* has an anti-tussive action.[14] It suppresses dry cough and has a soothing action on the respiratory tract, with no reported side effects.[15] The ethanolic extract of *A. officinalis* has an anti-bacterial action.[16]

Parsiāoshāṉ (*Adiantum capillus-veneris* L.)

Ibn Baitar's statement

It is *Mujaffif* (desiccant), *muhallil* (resolvent), and *mulattif* (demulcent) in action. Its temperament is in moderation between hot and cold. It helps in expelling morbid humors from the lungs, and its decoction is beneficial for bronchial asthma.[17]

Table 1: Ingredients of *Sharbat-i-Nazla*[2]

Drug	Botanical name and family	Part used	Proportion
Gul-i-Banafsha	*Viola odorata* L., Violaceae	Flower	1 kg
Barg-i-Gāozabāṉ	*Borago officinalis* L., Boraginaceae	Leaf	1 kg
Tukhm-i-Khaṭmī	*Althaea officinalis* L., Malvaceae	Seed	1 kg
Parsiyāoshāṉ	*Adiantum capillus-veneris* L., Pteridaceae	Whole	1 kg
Sapistāṉ	*Cordia dichotoma* G. Forst, Boraginaceae	Fruit	1 kg
'Unnāb	*Ziziphus jujuba* Mill., Rhamnaceae	Fruit	1 kg
Bādiyān	*Foeniculum vulgare* Mill., Apiaceae	Fruit	1 kg
Aṣl-al-Sūs	*Glycyrrhiza glabra* L., Leguminosae	Root	1 kg
Barg-i-Aṟūsa Khushk	*Justicia adhatoda* L., Acanthaceae	Dried leaf	500 g
Post Musallam	*Papaver somniferum* L., Papaveraceae	Poppy peel	500 g
Ajwā'in Desī	*Trachyspermum ammi* (L.) Sprague, Apiaceae	Seed	500 g
Mawīz Munaqqa Zard	*Vitis vinifera* L., Vitaceae	De-seeded fruit	2 kg
Tukhm-i-Khubbāzī	*Malva sylvestris* L., Malvaceae	Seed	1 kg
Ǫand Safaid	*Sugar*	Whole	200 kg

Scientific evidence

Adiantum capillus-veneris contains γ-sitosterol (plant steroid), a powerful antioxidant and anti-inflammatory substance. It is experimentally proven that γ-sitosterol can reduce DNA damage and alveolar apoptosis under conditions of hypoxia.[18] Triterpenoids present in *Parsiyaoshan* also have an anti-inflammatory effect. Anti-asthmatic and analgesic activity has also been identified in various extracts of the plant.[19]

Sapistāṉ (*Cordia dichotoma* G. Forst)

Ibn Sina's statement

It removes morbid humors from throat, lungs, and chest cavity through its laxative action. It also helps in relieving thirst.[9]

Scientific evidence

The alkaloids and flavonoids of *Cordia dichotoma* demonstrated anti-microbial activity against methicillin-resistant *Staphylococcus aureus*.[20] Ethanolic extracts of *C. dichotoma* demonstrated anti-fungal and anti-bacterial activity against various Gram-positive and Gram-negative bacteria *in vitro*. The crude ethanolic extract also demonstrated analgesic, anti-inflammatory, antibacterial, and cytotoxic activity in an animal study. *C. dichotoma* fruits also have gastro-protective and anti-ulcer activity.[21]

'Unnāb (*Ziziphus jujuba* Mill.)

Ibn Baitar's statement

It is highly beneficial for dry cough and sore throat. It is also beneficial for bronchial asthma and acts as a blood purifier.[22]

Scientific evidence

Jujuboside B, a natural saponin present in *Ziziphus jujuba* fruits has a protective activity against pulmonary inflammation and eosinophilia. It acts as a broncho-relaxant and anti-inflammatory.[23] The polysaccharides of *Z. jujuba* have an anti-oxidant and hepato-protective activity. Its terpenes and terpenoids exert an anti-inflammatory and anti-spasmodic action.[24]

Bādiyān (*Foeniculum vulgare* Mill.)

Ibn Baitar's statement

Bādiyān facilitates the expulsion of morbid humors from the chest cavity by loosening them. It is health-protective for all age groups, particularly for the stomach and liver. It also has a carminative and antipyretic action.[13]

Scientific evidence

Phytoconstituents dillapiol, psoralen, dillapional, scopoletin, etc., have demonstrated anti-bacterial, anti-viral, and anti-fungal activity against various microbes. Linoleic acid and oleic acid have a proven anti-mycobacterial activity. *β*-Myrcene and Limonene exert a hepatoprotective action. Anti-thrombotic activity is also observed, attributed to *trans*-Anethole. *Foeniculum vulgare* also has an expectorant, anti-allergic, and anxiolytic activity.[25]

Aṣl-us-Sūs (Glycyrrhiza glabra L.)

Ibn Baitar's statement

It is beneficial in relieving throat irritation, dry cough, inflammatory diseases of the chest cavity, and tracheal pain. It helps in clearing hoarseness of voice, removes morbid humors from the respiratory tract, and is helpful in resolving chronic pyrexia.[22]

Scientific evidence

Glycyrrhizin (saponin) and Glycyrrhetinic acid (triterpenoid derivative) have experimentally proven anti-viral activity against human immune-deficiency virus, human cytomegalovirus, herpes zoster virus, Epstein-Barr Virus, Influenza viruses, severe acute respiratory syndrome coronavirus (SARS-CoV), Hepatitis B and C viruses. They also have anti-bacterial against *Helicobacter pylori*, *Klebsiella penumoniae*, *Bacillus subtilits,* etc. Phytoconstituents

glycycoumarin, isoliquiritigenin, glycyrrhizin, liquiritin have a neuroprotective activity. Glycyrrhizin also has an anti-allergic, anti-tussive, anti-inflammatory, and corticosteroidal activity.[26]

***Barg-i-Aṟūsa* (*Justicia adhatoda* L.)**

Unani Pharmacopoeia of India

Justicia Adhatoda is an expectorant and anti-spasmodic. It is beneficial for cough, asthma, and pthisis.[27]

Scientific evidence

An alkaloid anisotine has been recently isolated from *J. Adhatoda* which has targeted activity against SARS-CoV-2 comparable to standard anti-viral drugs (darunavir and lopinavir).[28] In addition, the plant has also demonstrated broad-spectrum anti-bacterial, anti-fungal, anti-oxidant, anti-glycation, and cytotoxic activities in various pharmacological studies.[29]

***Post Musallam* (*Papaver somniferum* L.)**

Ibn Hubal Baghdadi's statement

Post-i-Khashkhāsh is sedative in nature. It is beneficial in cough, hemoptysis, and catarrhal diseases. Similar effects are seen in *khaskhāsh* seeds, although in lesser potency.[30]

Scientific evidence

Morphine and Buprenorphine derived from thebaine present in *Papaver somniferum* are among the most potent analgesic and anti-nociceptive drugs known.[31] In addition, it also contains flavonoids, amines, thiols, phenolic acids, etc., which exert important antioxidant and proteinase inhibitory activities.[32]

***Ajwā'in Desī* (*Trachyspermum ammi* [L.] Sprague)**

Ibn Sina's statement

It is a *mufattiḥ* (deobstruent), *mujaffif* (desiccant), and *mulayyin* (laxative) drug. It clears sepsis from the chest cavity, and is also beneficial in breathing difficulty. It relieves infective fevers, flatulence, nausea, and colic.[9]

Scientific evidence

Thymol, p-cymene, and γ-terpinene are major components of Ajowan essential oil. The oil demonstrated antibacterial activity against nine strains of major respiratory bacteria, including drug-resistant strains, in a recent *in vitro* study.[33] Its anti-tussive activity is attributed to its carvacrol component. In addition, *Trachyspermum ammi* also exerted anti-inflammatory, gastro-protective, hypolipidemic, anti-hypertensive, and anti-oxidant activities in various research studies.[34]

***Mawāz Munaqqa Zard* (*Vitis vinifera* L.)**

Ibn Sina's statement

Mawāz strengthens respiratory organs and is also a blood purifier.[9]

Scientific evidence

The polyphenols of *Vitis vinifera* have a potent anti-oxidant activity. A stilbenoid polyphenol Resveratrol, and Procyanidin found in *V. vinifera* has demonstrated anti-viral activity against many viruses, including influenza-A virus. The ethanolic extract has proven anti-fungal activity. Resveratrol and other polyphenols found in *V. vinifera* also have anti-bacterial activities, anti-oxidant, neuroprotective (Viniphenol A), anti-inflammatory (Vitisin A), and hepato-protective activities.[35]

***Tukhm-i-Khubbāzī* (*Malva sylvestris* L.)**

Ibn Sina's statement

It is anti-tussive and particularly effective for dry cough associated with hot temperament. It also has a soothing effect on the respiratory system.[9]

Scientific evidence

The hydroalcoholic extract of *Malva sylvestris* has an anti-bacterial activity.[36] Quercetin (flavonoid) and apigenin (trihydroxyflavone) components have an anti-inflammatory activity.[37] A broad-spectrum antimicrobial phytoalexin named Malvone A has also been identified in *M. sylvestris*. Besides, the plant also contains anthocyanidins and flavonoids which exert anti-oxidant and anti-inflammatory activity.[38]

Conclusion

Sharbat-i-Nazla contains an amazing combination of ingredients suited for respiratory infections. At least three ingredients of the syrup have an anti-viral activity, of which *Barg-i-Aṟūsa* has a proven activity against SARS-CoV-2. In addition, other ingredients provide additional effects such as bronchodilator, anti-tussive, anti-pyretic, anti-oxidant, and many others, as evident from the above description. Drugs such as *Bādiyān* and *Mawāz Munaqqa* also provide protection to vital organs and prevent the occurrence of complications. Given the widespread occurrence of thromboembolic occurrences and sudden death in COVID-19,[39] there is a need for preventive measures for the same. *T. ammi*, a component of *Sharbat-i-Nazla* has a proven hypolipidemic and anti-hypertensive activity, which may help in the prevention of such complications. The syrup may also be particularly beneficial for asthmatic patients due to its bronchodilator and soothing activity on the respiratory tract. In the light of Unani literature and the scientific evidence, *Sharbat-i-Nazla* may be a potentially useful drug in the management of COVID-19 and its complications.[40]

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Conflicts of interest

There are no conflicts of interest.

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Original Article

Standardization and High-performance Thin-layer Chromatography Fingerprinting of Unani Formulation *Habb-e-Zahar Mohra*

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Abstract

Background: *Habb-e-Zahar Mohra* is a classical herbo-mineral Unani formulation traditionally used for its *qābiḍ* (astringent) action in managing conditions such as *Ishal-e-Atfal* (diarrhea in children) and *Atash-e-Mufrit* (excessive thirst). Despite its therapeutic applications, the lack of standardization and quality assessment poses challenges to its efficacy and safety. **Objective:** This study aimed to standardize and evaluate the physicochemical, phytochemical, and chromatographic characteristics of *Habb-e-Zahar Mohra* to ensure its quality, safety, and reproducibility in adherence to Unani pharmacopoeial standards. **Materials and Methods:** The formulation was prepared following the National Formulary of Unani Medicine guidelines. Organoleptic, physicochemical (pH, moisture content, ash values, and extractive values), and phytochemical properties were evaluated. High-performance thin-layer chromatography (HPTLC) fingerprinting was performed using extracts in petroleum ether, chloroform, methanol, and aqueous solvents to establish a fingerprint profile for quality control. **Results:** Organoleptic and physicochemical properties: The prepared formulation exhibited consistent organoleptic characteristics (color: clay, odor: agreeable, texture: uniform) and physicochemical properties. The pH was 6.30, moisture content was 8.1%, total ash value was 8.31%, acid-insoluble ash was 6.15%, and water-soluble ash was 0.12%. Extractive Values: Extractive values were highest in aqueous extract (12.65%), followed by methanol (4.26%), chloroform (4.02%), and petroleum ether (1.85%). HPTLC fingerprinting: HPTLC analysis revealed distinct peaks under ultraviolet light at 254 nm and 366 nm, with variations in Rf values and area percentages across solvent extracts. Methanol and aqueous extracts showed the highest number of peaks, indicating a rich phytochemical profile. **Conclusion:** The study successfully standardized *Habb-e-Zahar Mohra*, ensuring its consistency, quality, and safety. HPTLC fingerprinting established a reliable chemical profile, providing a scientific basis for the formulation's therapeutic claims. This approach supports the global acceptance of traditional Unani medicine by aligning with modern quality control practices.

Keywords: *Habb-e-Zahar Mohra, high-performance thin-layer chromatography fingerprinting, physicochemical analysis, standardization, Unani medicine*

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Introduction

The standardization and evaluation of Unani formulations are crucial for ensuring these traditional medicine's quality, safety, and efficacy. *Habb-e-Zahar Mohra* is a classical Unani Pharmacopeial formulation with a herbo-mineral origin. It is used extensively in conventional Unani medicine for its diverse therapeutic effects. It is a formulation attributed with *Qābiḍ* (astringent) pharmacological action and is traditionally prescribed for managing *Ishal-e-Atfal* (diarrhea in children) and *Atash-e-Mufrit* (excessive thirst).[1,2] In addition, it is used in various conditions due to its constituents, which are recognized for their antidote, anti-inflammatory, antiviral, and immunomodulatory properties.[3-9]

The formulation derives its name from its principal ingredient, "*Zahar Mohra*" (Serpentine stone), which is believed to possess potent antidotal and analgesic properties. Along with *Zahar Mohra*, the composition of *Habb-e-Zahar Mohra* includes other herbal and mineral ingredients such as Tabasheer (Bamboo Silica) and other pharmacologically active components [Table 1]. These ingredients are carefully processed following classical Unani pharmacopoeial guidelines to enhance their safety, efficacy, and therapeutic potential.

Standardization, including modern techniques like high-performance thin layer

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chromatography (HPTLC) fingerprinting, plays a vital role in ensuring the consistency and quality of *Habb-e-Zahar Mohra*. This approach helps to validate its formulation and provides a scientific basis for its therapeutic claims, ensuring it meets global quality standards for traditional medicine.

Materials and Methods

Procurement and authentication

The raw ingredients for *Habb-e-Zahar Mohra* were procured from Nadeem Dawakhana, Delhi, and authenticated by experts from the Department of Ilmul Advia, SUMER and Department of Botany, SCLS, Jamia Hamdard. Identification and verification were conducted to ensure compliance with Unani pharmacopoeial standards.

Formulation preparation

The formulation was prepared following the National Formulary of Unani Medicine guidelines:

1. Granulation
   - Ingredients were powdered, sieved (80-mesh), and mixed in specified ratios
   - A wet mass was prepared by adding water, passed through a 10-mesh sieve (granule size: 0.2–4.0 mm), and dried in the shade for 3–4 days.
2. Tablet formation
   - Dried granules were compressed into uniform tablets using a compression machine in the Department of Ilmul Advia, SUMER, JH.
3. Packaging and storage
   - Tablets were packed in airtight PET containers with silica gauze to prevent moisture
   - Labeled containers included dosage details: *Habb-e-Zahar Mohra* (250 mg, twice daily).

Table 1: Ingredients of Habb-e-Zahar- Mohra

Unani name	Scientific/botanical name
Zahar-Mohra	Serpentine/borage stone
Samagh Arbi	*Acacia arabica*
Zaranbad	*Crucuma zedoaria*

Table 2: Comparison of physical properties of *Habb-e-Zahar* Mohra with the standards of Unani formulary characteristics

Physicochemical properties	Standard as per Unani formulary[2]	Test drug: Formulated
Appearance	Tablet	Tablet
Color	Clay	Clay
Smell	Agreeable	Agreeable
Taste	Tasteless, slightly chilling	Slightly bitter, chilling

Standardization

The formulation underwent organoleptic, physicochemical, and phytochemical evaluations to ensure quality and safety Tables 2-10:

- Organoleptic properties: Assessed for color, odor, texture, and taste
- Physicochemical tests: Moisture content, pH, ash values, and extractive values were determined
- Phytochemical screening: Alkaloids, glycosides, tannins, and flavonoids were qualitatively analyzed.

High-performance thin-layer chromatography fingerprinting

HPTLC was performed to establish a fingerprint profile Figures 1-6:

- Sample preparation: Hydroalcoholic extracts of tablets were used
- Chromatographic conditions:
  - Stationary phase: Silica gel 60 F254 plates
  - Mobile phase: Optimized solvent system for active constituents
  - Detection: Ultraviolet (UV) light visualization at 254 nm and 366 nm.
- Data Analysis: Rf values and chromatogram peaks were documented for quality control and reproducibility.

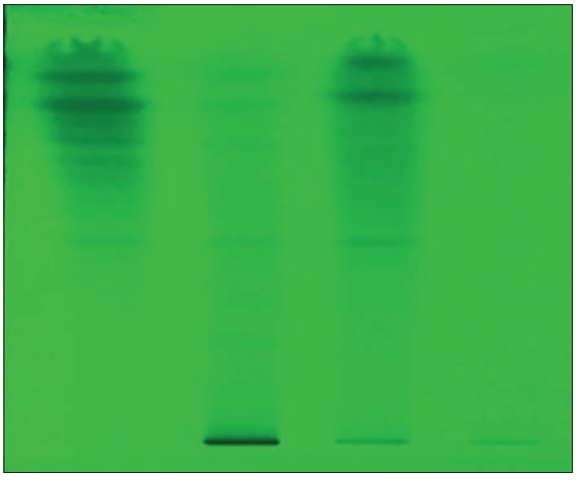

Figure 1: Under ultraviolet light of 254nm

Table 3: Extract Values of *Habb-e-Zahar Mohra*

Extracts	Weight of drug (g)	Weight of empty beaker (g)	Weight of beaker with extraction	Weight of extract (g)	Weight of extractive matter (%)
Petroleum ether	50	51.217	52.146	0.01858	1.85
Chloroform	50	33.175	35.184	0.04018	4.018
Methanol	50	53.004	55.134	0.0426	4.26
Aqueous	50	33.31	39.634	6.324	12.648

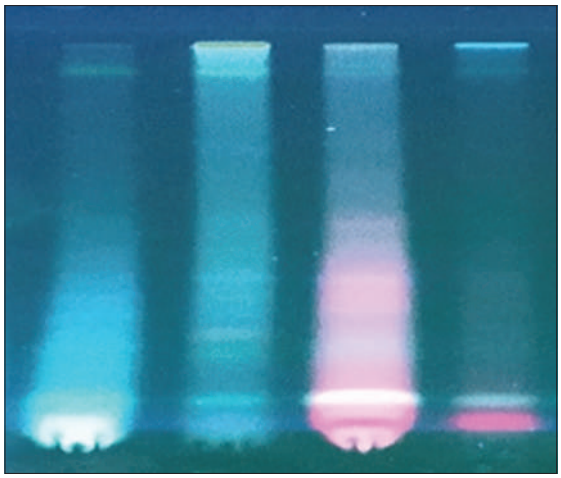

Figure 2: Under ultraviolet light of 366 nm

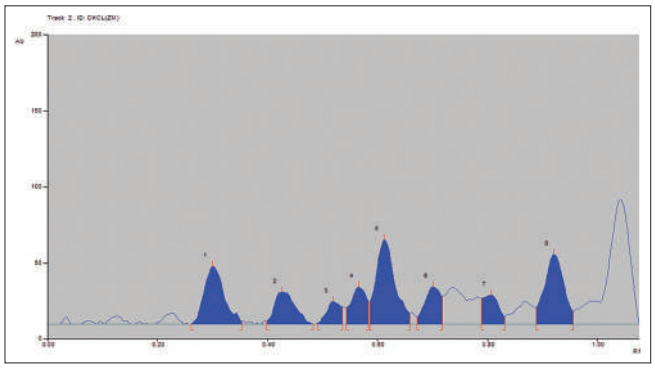

Figure 4: Chromatogram of *Habb-e-ZaharMohra* 254 nm (Track-2)

Table 4: Thin-layer chromatography-*Habb-e-Zahar Mohra*

Solvent	Short wavelength (254 nm) spot	Long wavelength - (366 nm) spot
Petroleum ether	6	2
Chloroform	4	6
Methanol	2	5
Aqueous	0	4

This comprehensive process ensured adherence to Unani standards and guaranteed the formulation's safety, efficacy, and consistency.

Results

Physio-chemical standardization of test drug

The test drug was assessed and fingerprinting was done using the following parameters:

Determination of ash value

Determination of ash value for Habb-e-Zahar Mohra

To determine the ash value of *Habb-e-Zahar Mohra*, 6 g of powdered drug were placed in a silica crucible and incinerated at 450°C for 6 h. After the incineration

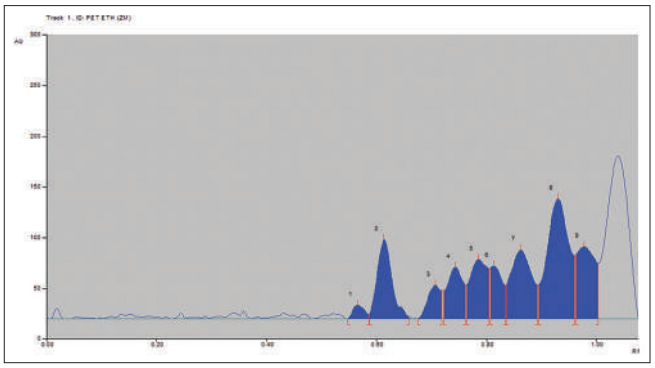

Figure 3: Chromatogram of *Habb-e-Zahar Mohra* 254 nm (Track-1)

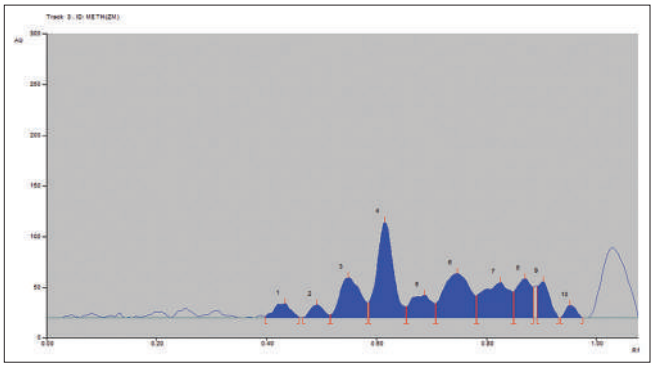

Figure 5: Chromatogram of *Habb-e-ZaharMohra* 254 nm (Track-3)

process, the crucible was allowed to cool at room temperature. The remaining ash content was then measured to calculate the total ash value. The percentage of total ash value was calculated using the following formula:

% Total Ash value = (weight of drug taken) ÷ (weight of total ash) × 100

For *Habb-e-Zahar Mohra*, the total ash value was found to be 8.31%, indicating the mineral content of the formulation and contributing to its overall quality assessment.

Acid insoluble ash for Habb-e-Zahar Mohra

To determine the acid-insoluble ash content of *Habb-e-Zahar Mohra*, 6 g of the powdered drug was initially incinerated as described in the total ash value determination. After this, the remaining ash was mixed with 10 ml of hydrochloric acid and 90 ml of water, ensuring no sample adhered to the sides of the container. The mixture was boiled in a water bath for 10 min.

The insoluble matter collected on ashless filter paper was thoroughly washed with hot water to remove any soluble components. After washing, the insoluble matter was ignited at 450°C for 6 h in a furnace.

The percentage of acid-insoluble ash was calculated using the formula:

Table 5: Rf values of Habb-e- ZaharMohra at 254 nm (track-1)

Peak	Rf value	Maximum height (AU)	Maximum (%)	Area (%)
1	0.55	13.3	2.45	1.65
2	0.59	78.0	14.34	12.16
3	0.68	33.5	6.16	4.61
4	0.72	50.9	9.37	8.34
5	0.76	58.3	10.72	10.74
6	0.81	52.2	9.60	6.56
7	0.84	68.1	12.53	14.88
8	0.90	118.3	21.76	27.13
9	0.96	71.0	13.06	13.93

Table 6: Rf values of Habb-e- *Zahar Mohra* at 254 nm (track-2)

Peak	Rf value	Maximum height (AU)	Maximum (%)	Area (%)
1	0.26	38.1	15.68	17.13
2	0.40	21.0	8.61	9.95
3	0.49	14.9	6.11	4.78
4	0.54	24.5	10.07	8.49
5	0.59	55.6	22.84	23.74
6	0.67	24.4	10.05	8.78
7	0.79	19.0	7.82	7.09
8	0.89	45.8	18.83	20.04

Table 7: Rf values of Habb-e- ZaharMohra at 254 nm (track-3)

Peak	Rf value	Maximum height (AU)	Maximum (%)	Area (%)
1	0.40	14.3	4.09	3.73
2	0.47	13.0	3.72	2.72
3	0.52	39.5	11.32	12.70
4	0.59	94.3	27.02	23.74
5	0.66	22.4	6.42	7.27
6	0.71	43.8	12.56	17.75
7	0.78	35.0	10.02	14.29
8	0.85	38.4	11.01	9.07
9	0.89	35.9	10.28	6.68
10	0.94	12.4	3.55	2.05

Table 8: Rf values of Habb-e- *Zahar Mohra* at 254 nm (track-4)

Peak	Rf value	Maximum height	Maximum (%)	Area (%)
1	1.00	13.7 AU	100.00	100.00

% Acid Insoluble Ash = (Weight of Acid Insoluble Ash) ÷ (Weight of Drug Taken) × 100%

For *Habb-e-Zahar Mohra*, the acid-insoluble ash value was found to be 6.15%, which reflects the mineral content of the formulation that is not soluble in acid and contributes to its quality and stability.

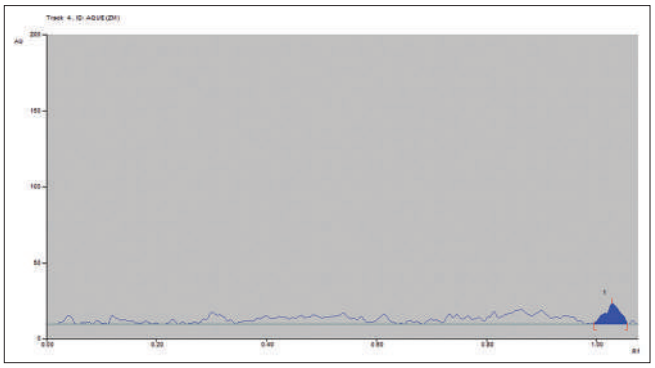

Figure 6: Chromatogram of *Habb-e-Zahar Mohra* 254 nm (Track-4)

Water soluble ash

The water-soluble ash content of *Habb-e-Zahar Mohra* was determined by dissolving the total ash in distilled water. The insoluble portion was filtered, washed, and ignited at 450°C. The soluble ash was calculated by subtracting the weight of the insoluble portion from the total ash. The percentage of water-soluble ash was found to be 0.12%, reflecting the portion of the ash that could dissolve in water.

Loss on drying

The moisture content of *Habb-e-Zahar Mohra* was determined by placing a 2.0 g powdered sample on a tarred evaporating plate, which was then dried at 105°C for 6–8 h. The drying process continued until two consecutive weight readings were consistent. The percentage of moisture content, calculated based on the loss in weight after drying, was found to be 8.1%. This value reflects the amount of water present in the sample before drying.

Determination of pH

The pH of *Habb-e-Zahar Mohra* was determined by preparing a 1% solution of the drug. For *Habb-e-Zahar Mohra*, 1.0 g of the drug was dissolved in 100 mL of distilled water, followed by filtration. The pH was measured using a standard glass electrode submerged in the filtered solution. The pH of *Habb-e-Zahar Mohra* was found to be 6.30.

Determination of extracting value

Successive extraction

The extracting values of *Habb-e-Zahar Mohra* were determined using successive extraction. In this process, 50 g of powdered drug was subjected to extraction in a Soxhlet apparatus with different solvents: petroleum ether, chloroform, methanol, and water. The extracts were then evaporated to dryness using a water bath, and the constant extractive weights were recorded. The percentage of successive soluble extractives was calculated using the formula:

% Successive Soluble Extractive = (Weight of Extract × 100)/Weight of Drug Taken

Table 9: Habbe *Zahar Mohra* at 254 nm wavelength

Extract (Zahar-Mohra)	Number of peaks	Rf values	Area (%)
Petroleum ether	9	0.55–0.96	1.65–13.93
Chloroform	8	0.26–0.89	17.13–20.04
Methanol	10	0.40–0.94	3.73–2.05
Aqueous	1	1.00	100.00

Table 10: Habbe *Zahar Mohra* at 366 nm wave length

Extract (Zahar-Mohra)	Number of peaks	Rf values	Area (%)
Petroleum ether	7	0.01–1.01	1.22–15.93
Chloroform	3	0.60–1.01	30.40–21.71
Methanol	4	0.41–0.92	4.63–52.7
Aqueous	3	0.03–0.92	10.41–81.50

The extraction values obtained for each solvent are as follows:

- Petroleum Ether: Extracted 1.85% of the drug
- Chloroform: Extracted 4.018% of the drug
- Methanol: Extracted 4.26% of the drug
- Aqueous: Extracted 12.648% of the drug.

These values reflect the different solubility characteristics of the active compounds in the drug when exposed to various solvents.

Chromatographic analysis

TLC fingerprinting profiles were developed for the aqueous, petroleum ether, chloroform, and methanol extracts of *Habb-e-Zahar Mohra* to establish a qualitative profile of the constituents.

TLC is a widely used, contemporary, and automated technique for separating components to generate reference fingerprints for herbs. These fingerprints serve as benchmarks to assess the raw materials and assay the final product for consistency and quality.

This method ensures that the extract's composition adheres to the expected standards, providing a reliable tool for quality control.

Sample preparation for thin layer chromatography

The powdered drug sample (50 g) of *Habb-e-Zahar Mohra* was placed in a round-bottom flask, and 500 mL of the respective solvent (petroleum ether, chloroform, methanol, or water) was added to extract the active constituents. The extraction was performed using a Soxhlet apparatus for 6 h. The resulting solution was filtered, and the filtrate was evaporated to dryness in a water bath and weighed.

For TLC fingerprinting, 30 mg of each extract was dissolved in 1.0 mL of the corresponding solvent. Aqueous extracts were dissolved in methanol. All solutions were filtered through a 0.45 µm syringe filter, yielding extract solutions with a concentration of 20 mg/mL.

Thin layer chromatography analysis procedure

1. Sample application: 4 µL of each filtered extract solution was applied to 10 cm × 10 cm silica gel 60 F254 precoated TLC plates using a CAMAG Linomat-V applicator, with a bandwidth of 6.0 mm and a sample flow rate of 150 nL/s
2. Development: The plates were eluted to a distance of 8.5 cm in a solvent system of toluene: ethyl acetate: formic acid (5:4:1, v/v/v) within a CAMAG twin-trough glass tank presaturated with the mobile phase for 30 min at room temperature
3. Visualization: Developed plates were air-dried and photographed under short-wave UV light (254 nm) and long-wave UV light (366 nm)
4. Scanning: The plates were scanned using a CAMAG TLC densitometry scanner III controlled by winCATS software. The scanning parameters included:
   - Radiation source: Tungsten lamp
   - Slit Dimensions: 6.0 mm × 0.3 mm
   - Scanning Speed: 10 mm/s.

This detailed procedure allowed for the qualitative evaluation of chemical constituents and the creation of reliable TLC fingerprints for quality control and comparative analysis of the extracts.

Chromatograms of extracts of Habb-e-Zahar Mohra

Figures 1-6.

Discussion

The present study aimed to standardize and evaluate the quality of the Unani formulation *Habb-e-Zahar Mohra* through comprehensive physicochemical, phytochemical, and chromatographic analyses. Standardization is critical in ensuring the safety, efficacy, and reproducibility of traditional medicine formulations, which often face challenges due to variable raw material quality, preparation methods, and environmental factors.[10]

Organoleptic and physicochemical properties

Organoleptic parameters (e.g., color, odor, and texture) were consistent with the standards outlined in the Unani Pharmacopoeia, ensuring proper formulation. Physicochemical evaluations provided a detailed assessment of the quality of the drug. For instance, the pH value (6.30) indicated a slightly acidic nature, suitable for its therapeutic applications, including its *qābiḍ* (astringent) properties.[1,2]

The low moisture content (8.1%) ensures stability and reduces susceptibility to microbial contamination, while the ash value (total ash 8.31%, acid-insoluble ash 6.15%, and water-soluble ash 0.12%) reflects the appropriate balance of mineral components in the formulation. These values align with pharmacopoeial limits, ensuring consistency in mineral composition and quality.[1,2]

Phytochemical screening

The qualitative analysis indicated the presence of bioactive compounds such as alkaloids, glycosides, flavonoids, and tannins. These phytochemicals are well known for their therapeutic roles, including anti-inflammatory, immunomodulatory, and antioxidant properties. The most prominent health benefits of phenolic compounds are antioxidant activity, anti-inflammatory properties, antifungal activity, antimicrobial activity, antibacterial properties, anti-coronavirus activities, neuroprotective potential, appropriate for skin health, suitable for wound healing, and anticancer activities while flavonoids possess several medicinal benefits, including anticancer, antioxidant, anti-inflammatory, and antiviral properties. They also have neuroprotective and cardio-protective effects.[11,12] The presence of these compounds supports the traditional claims of *Habb-e-Zahar Mohra*'s efficacy in managing conditions such as diarrhea and excessive thirst.[1,2]

Successive extraction and solvent analysis

The extraction process revealed varying solubility profiles of active compounds in different solvents. The aqueous extract showed the highest extraction yield (12.648%), reflecting the hydrophilic nature of several active constituents. Methanol and chloroform extracts also exhibited moderate extractive values (4.26% and 4.018%, respectively), indicating the presence of compounds with polar and semi-polar characteristics. Petroleum ether, with the lowest extractive value (1.85%), primarily extracted nonpolar compounds such as lipids and waxes.

High-performance thin-layer chromatography fingerprinting

HPTLC fingerprinting established a robust chromatographic profile for *Habb-e-Zahar Mohra*. Chromatograms obtained under UV light at 254 nm and 366 nm identified distinct peaks corresponding to various active constituents.

Petroleum ether extract

The extract displayed 9 peaks at 254 nm and 7 peaks at 366 nm. The major compounds were observed at Rf values between 0.55 and 0.96 (Area %: 1.65–13.93 at 254 nm). These peaks correspond to lipophilic constituents.

Chloroform extract

The chloroform extract revealed 8 peaks at 254 nm and 3 peaks at 366 nm. The significant peaks at 254 nm ranged from Rf 0.26 to 0.89 (Area %: 17.13–20.04), indicating the presence of semi-polar compounds such as alkaloids and glycosides.

Methanol extract

This extract demonstrated 10 peaks at 254 nm and 4 peaks at 366 nm. The major constituents at 254 nm appeared between Rf 0.40 and 0.94 (Area %: 3.73–23.74). Methanol extracts primarily polar and semi-polar compounds, including flavonoids and tannins.

Aqueous extract

The aqueous extract showed only 1 peak at 254 nm (Rf 1.00, Area %: 100%) and 3 peaks at 366 nm (Rf 0.03–0.92, area %: 10.41–81.50). This suggests a high concentration of hydrophilic constituents, including polysaccharides and phenolics.

Comparative analysis

The diversity in peak profiles across different solvents highlights the complexity of the formulation. Aqueous and methanolic extracts showed prominent peaks, reflecting their role as primary carriers of the bioactive compounds in the formulation. The chromatographic profiles can serve as a reference for future quality control, ensuring consistency across batches.

Therapeutic implications

The presence of bioactive phytochemicals corroborates the traditional use of *Habb-e-Zahar Mohra* in treating diarrhea (Ishal-e-Atfal) and excessive thirst (Atash-e-Mufrit).[1,2] Furthermore, the anti-inflammatory and immunomodulatory potential of the identified constituents aligns with its traditional use as an antidote and in other therapeutic applications.[13-15]

Limitations and future directions

While the study established a fingerprint profile and assessed physicochemical properties, further *in vitro* and *in vivo* studies are required to validate the pharmacological claims and mechanisms of action. Advanced techniques such as LC-MS/MS and NMR spectroscopy could also be employed to identify and quantify the active constituents more precisely.

Conclusion

The study successfully standardized *Habb-e-Zahar Mohra* using a combination of traditional and modern analytical techniques. The findings validate the quality and efficacy of the formulation, supporting its therapeutic claims in Unani medicine. The HPTLC fingerprinting profiles provide a robust framework for quality control and can aid in regulatory compliance, ensuring safety and efficacy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Evaluation of the *In vitro* Anti-inflammatory Activity of Ethanolic and Aq-ethanolic Extracts of Gum Resins *'Uṣāra Raywand* (*Rheum australe* D. Don), *Ushuq* (*Ferula ammoniacum* [D. Don] Spalik), and *Anzarūt* (*Astragalus sarcocolla* Dymock.)

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Abstract

Background: Inflammation is a primary cause of disease and a core target in many traditional Unani remedies. Gum resins such as *Uṣāra Raywand*, Ushaq and Anzarūt from *Rheum australe*, *Dorema ammoniacum* and *Astragalus sarcacola*, respectively, are used in Unani medicine for their demulcent, antiseptic, and anti-inflammatory actions. **Aims and Objectives:** This study aimed to validate its traditional use by assessing in vitro anti-inflammatory activity. **Materials and Methods:** Gum-resins were collected from the market and processed for extraction separately through the cold maceration method in solvents Ethanol and Hydro alcoholic (ethanol) (1:1) solution for 48 h at room temperature. The anti-inflammatory activity was determined using the Protein Denaturation and RBC Membrane Stabilization Assay. **Results:** The inhibition percentage of egg albumin(protein) denaturation by all extracts was found in a concentration-dependent manner. Usara raywand hydro alcoholic extract (UREtOH) showed comparable results with the standard diclofenac sodium. All other extracts showed satisfactory activity. The inhibition percentage of lysis of erythrocyte membrane by all extracts was found in concentration concentration-dependent manner. Ushuq hydro alcoholic extract (UQEtOH) showed comparable results with diclofenac sodium. All other extracts showed satisfactory activity. **Conclusion:** The study findings revealed that the gum resins could be potentially used as a natural anti-inflammatory drug, as claimed by Unani physicians.

Keywords: *Anti-inflammatory, Anzarūt, gum resin, 'Uṣāra Raywand, ushuq*

Introduction

During the last decades, special emphasis has been laid on the use of traditional medicine worldwide. In India, 70% of the population depends on traditional herbal medicine to help meet their healthcare needs.[1] The Unani system of medicine started in Greece, tends to be safe, comprehensive, and economical in long-term use and is easily available. Extensive adverse effects in whole plant or plant parts or their exudates have been used for treatment from time immemorial.[2] Plant exudates have also been mentioned in classical literature for the treatment of various diseases. Their use in different inflammatory conditions of infectious and noninfectious etiology and other diseases has also been mentioned.[3] Inflammation is a biological response of the immune system that can be triggered by various factors, including pathogens, damaged cells, and toxic compounds or irradiation, and acts by removing injurious stimuli and initiating the healing process. At the tissue level, inflammation is characterized by redness, swelling, heat, pain, and loss of tissue function or injury. The etiologies of inflammation can be infectious and noninfectious.[4]

In Unani medicine, the concept of inflammation, as understood in modern medical terminology, is not explicitly defined. Instead, the term *Waram* is used to describe abnormal swelling. This term encompasses a range of conditions characterized by localized accumulation of substances such as blood, pus, water, or gas. In many cases, *Waram* aligns with what modern medicine would classify as inflammatory responses, particularly acute inflammation (*Ḥārr*).

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The treatment of *Waram* in Unani medicine is carefully customized, taking into account various factors such as the nature of the swelling, its underlying causes, the temperament (*Mizāj*) of the patient, and the affected organ or tissue. While Unani medicine does not explicitly define inflammation in the modern sense, it encompasses the concept of "*Waram*," which refers to various pathological swellings that may correspond to inflammatory conditions. Treatment in Unani medicine is highly individualized, considering the nature of the swelling, the type of material involved, and the affected organ system. A wide range of medicinal substances is employed to address these conditions effectively. Gums and resins have a long-standing traditional use in Unani medicine, a holistic healing system rooted in Greco-Arabic principles. These natural substances, derived from plants, have been valued for their medicinal properties and therapeutic applications. *'Uṣāra Raywand* ٲ (*Rheum australe* D. Don), *Ushuq* (*Ferula ammoniacum* (D. Don) Spalik), and *Anzarūt* (*Astragalus sarcocolla* Dymock.) are gum resins that have been used as anti-inflammatory, analgesic, and wound healers for centuries in Unani Medicine.[5,6] These gum resins are widely used in traditional medicine and nowadays their potential activities are scientifically proven as antioxidant, anti-inflammatory, and antitumor. The objective of this work is to understand their mode of action as anti-inflammatory agents by two methods, namely protein denaturation method and RBC membrane stabilization method as no such work has been done to date. It is well-documented that the denaturation of proteins is one of the causes of inflammation.[7] Furthermore, some experimental studies suggest that some anti-inflammatory drugs stabilize serum proteins against heat denaturation.[8]

Materials and Methods

The materials which are used include Alsever's solution, sodium chloride, disodium hydrogen phosphate dihydrate, sodium dihydrogen phosphate monohydrate (Sigma-Aldrich, Merck USA), and standard drug diclofenac sodium (Novartis). All chemicals and reagents used were of analytical grade.

Collection of gum resin and extraction procedure

Gum resins of *Raywand* (*Rheum australe* D. Don), *Ushuq* (*Ferula ammoniacum* (D. Don) Spalik), and *Anzarūt* (*Astragalus sarcocolla* Dymock.) were procured from the local market of Srinagar, Jammu and Kashmir (India) in January 2022. The plant was identified by a taxonomist of the Botany Department, University of Kashmir, Srinagar India. A voucher specimen was submitted for future reference in the Department of Botany Herbarium, University of Kashmir under Voucher No of three plant exudates 8041 KASH, 8042 KASH, and 8043 KASH.

Gums resins were cleaned separately and subjected to grinding. The gum resins powder was extracted separately through the cold maceration method in solvents Ethanol and Hydro alcoholic (ethanol) (1:1) solution for 48 h at room temperature. The extracts obtained were evaporated in a water bath. The weight of yield is recorded and is stored in a desiccator for further use.

Procurement of sheep blood

Sheep blood was used in this experiment which was procured from the Pharmacology Department of Government Medical College, Srinagar.

Methods of evaluation of *in vitro* anti-inflammatory activity

Protein denaturation assay

The protein denaturation-inhibition test was done following the established protocol with some minor modifications to investigate the protein denaturation inhibition activity of three gum resin extracts.[9]

The reaction mixture consisted of 0.2 mL of egg albumin (from fresh hen's egg white), 2.8 mL of phosphate-buffered saline (PBS 6.4), and 2 mL of varying concentrations of extract so that final concentrations become 100, 200, 300, 400, and 500 µg/mL Similar volume of double distilled water served as control. Then, the mixture was incubated at (37°C ± 2) in a BOD incubator for 15 min and then heated at 70°C for 5 min. After cooling their absorbance was measured at 660 nm using a vehicle as blank by a colorimeter. Diclofenac sodium was used as a standard drug at the final concentrations of 100, 200, 300, 400, 500 µg/mL and treated similarly for determination of absorbance. The percentage inhibition (%) of protein denaturation was calculated using the following equation:

$$\% \text{ inhibition} = 100 \times \frac{\text{Abs control - Abs test}}{\text{Abs control}}$$

Where:

Abs test = absorbance of the test sample.

Abs control = absorbance of the control sample.

Erythrocyte membrane stabilization method

Erythrocyte suspension

Sheep red blood cell was used in the experiment. Whole blood was collected from healthy sheep under sterilized

conditions and mixed with the same volume of Alsever's solution to prevent clotting. The mixture was centrifuged at 3000 rpm at room temperature to separate the packed cell volume. The supernatants were carefully removed, whereas packed cell volumes were washed three times with an isosaline solution (0.9% w/v NaCl, pH 7.2). A 10% v/v suspension of packed cells was made with an isosaline solution and stored in the refrigerator for further use.

Hypotonic solution-induced hemolysis

The isotonic buffer solution (pH 7.2) was composed of which contained in 100 ml of distilled water: NaH2PO4.2H2O, 134 mg; Na2HPO4. 34 mg, (0.01M sodium phosphate buffer) was prepared. The experiments were carried out in triplicates. Stock erythrocyte suspension of 10 ml was prepared each time. The reaction mixture contains 1 ml PBS (7.4 pH), 2 ml hypotonic solution (0.9% w/v NaCl, pH 7.2), and 0.5 ml RBC suspension, and the test extracts at varying concentrations of 5, 10, 20, and 30 µg/mL, while the control sample was mixed with drug-free solution. The mixtures were incubated for 30 min at room temperature, and centrifuged for 3 min at 1300 g and the absorbance (optical density) of the supernatant was measured at 640 nm using a colorimeter. Diclofenac sodium was used as a reference standard at varying concentrations of 5, 10, 20, and 30 µg/ml. The percentage inhibition of membrane stabilization was calculated using the following formula;

$$\% \text{ inhibition of lysis} = 100 \times \frac{\text{Abs control - Abs test}}{\text{Abs control}}$$

Where:

Abs test = Absorbance of test.

Abs control = Absorbance of control.

Statistical evaluation

The data were analyzed by Graph Pad prism version 9.5.0 (Graph Pad software, LLC, Boston, MA 02110, USA). Data of anti-inflammatory activity by protein denaturation method and erythrocyte membrane stabilization were analyzed by one-way ANOVA where the level of significance was $P < 0.05$.

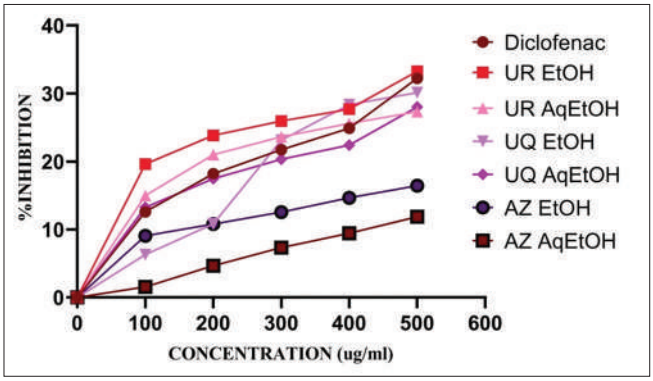

Figure 1: Effect of extracts of namely *'Uṣāra Raywand* (*Rheum australe* D. Don), *Ushaq* (*Dorema ammoniacum*), and *Anzarūt* (*Astragalus sarcocolla*) on egg albumin denaturation

Results

Inhibition of protein denaturation

When looking at the graph [Figure 1], it is observed that the inhibition of protein denaturation by all extracts was found in a concentration-dependent manner. Five concentrations (100, 200, 300, 400, and 500 µg/ml) of all extracts were examined. *R. australe* (GH) (UREtOH) extract percentage inhibition value at 500 µg/ml concentration level (33.1% ± SD) which was higher than the percentage inhibition value at the same concentration level (32% ± SD) obtained with diclofenac sodium reference drug. Both extracts of *R. australe* showed better results than standard reference at all concentrations. Similarly, rest two test drugs *Dorema ammoniacum* (DA) and *Astragalus sarcocolla* (AS) extract percentage inhibition (pi) at different concentrations with the respective concentration of the standard drug is compared. They also show concentration-dependent increasing activity with increasing concentration. At 500 µg/ml concentration level, DA (UEtOH) showed (pi) (30.1%± standard deviation (SD) and DA (UAqEtOH) showed (pi) (28.03% ± SD) at 500 µg/ml concentration. AS (AZEtOH) showed (pi) (16.4% ± SD) and (AS) (AZAq-EtOH) showed (pi) (11.8% ± SD) as shown in Table 1 and Figure 1.

Membrane stabilization

It is observed from the present study that the percentage inhibition of lysis of erythrocyte membrane by all extracts was found in a concentration-dependent manner. Four concentrations (5, 10, 20, 30 µg/ml) of all three gum resin extracts were examined. DA (UEtOH) extract showed the percentage inhibition value at 30 µg/ml concentration level (27.06% ± 2.04) and (DA) (UAq-EtOH) showed the percentage inhibition value at 30 µg/ml concentration level (30.5% ± 4.7) obtained with diclofenac sodium reference drug. Similarly, rest two test drugs (GH) and (AS) extract percentage inhibition at different concentrations with the respective concentrations of standard drugs are compared. They also show concentration-dependent increasing activity with increasing concentration. At 30 µg/ml concentration level (GH) ethanolic extract (UREtOH) showed (pi) (27.06% ± SD) and *(GH* aqueous extract (URAqEtOH) showed (pi) (30.5% ± SD). AS ethanolic extract (AZEtOH) showed (pi) (23.6% ± SD) and AS aqueous ethanolic extract (AZAq-EtOH) showed (pi) (30.5% ± SD) as shown in Table 2 and Figure 2.

Discussion

Inflammation is a very common symptom of many acute and chronic diseases. It is a complex dynamic protective response to cell injury, and infection via microbes, trauma, or toxins in the vascularized tissues. Tissue degeneration is a well-known example of inflammatory disorders. Tissue injury could be caused by denaturation of cell protein components or intercellular material.[10] Furthermore, protein denaturation

Table 1: *In vitro* anti-inflammatory activity on various extracts of *'Uṣāra Raywand*, *Ushaq*, and *Anzarūt* by protein denaturation method

Sample	Concentration (µg/mL)	Absorbance	%inhibition ± SD
Standard (diclofenac sodium)	100	0.83	12.6±0.00
	200	0.77	18.20±1.6
	300	0.74	21.73±0.63
	400	0.71	24.9±1.21
	500	0.64	32.23±0.63
Ethanol extract of *'Uṣāra Raywand* (UREtOH)	100	0.76	19.63±0.63
	200	0.72	23.8±0.63
	300	0.70	25.9±0.63
	400	0.68	27.7±1.21
	500	0.63	33.2±0.05
Aq-ethanol extract of *'Uṣāra Raywand* (UR AqEtOH)	100	0.80	15±1.2
	200	0.75	21±0.86
	300	0.72	23.6±0.55
	400	0.70	25.6±1.2
	500	0.69	27.33±1.05
Ethanol extract of *Ushaq* (UQEtOH)	100	0.89	6.3±0.05
	200	0.84	10.8±0.57
	300	0.73	23.1±1.05
	400	0.68	28.3±1.05
	500	0.66	30.1±0.63
Aq-ethanol extract of *Ushaq* (UQAqEtOH)	100	0.82	13.2±0.05
	200	0.78	17.4±0.05
	300	0.75	20.3±0.05
	400	0.73	22.4±1.2
	500	0.68	28.03±0.63
Ethanol extract of *Anzarūt* (AZEtOH)	100	0.86	9.06±0.57
	200	0.84	10.8±1.2
	300	0.83	12.5±1.05
	400	0.81	14.6±1.05
	500	0.79	16.4±0.63
Aq-ethanol extract of *Anzarūt* (AZAqEtOH)	100	0.93	1.5±0.52
	200	0.90	4.6±0.92
	300	0.88	7.3±1.05
	400	0.86	9.4±1.05
	500	0.83	11.8±0.63

All values are expressed as mean±SD (*n*=3). SD: Standard deviation

Table 2: Effect of extracts of *'Uṣāra Raywand*, *Ushaq* and *Anzarūt* gum resin on hypo tonicity induced hemolysis of erythrocyte membrane

Sample	Concentration (µg/mL)	Absorbance	%inhibition ± SD
Diclofenac sodium	5	0.21	12.4±4.1
	10	0.18	23.6±2.4
	20	0.16	31.9±2.4
	30	0.14	41.6±4.1
Ethanol extract of *'Uṣāra Raywand* (UREtOH)	5	0.21	11.06±4.7
	10	0.20	13.8±2.3
	20	0.18	22.2±2.4
	30	0.17	27.06±2.04
Aq-ethanol extract of *'Uṣāra Raywand* (URAqEtOH)	5	0.21	12.4±4.1
	10	0.19	20.8±4.2
	20	0.17	27.7±2.3
	30	0.16	30.5±4.7
Ethanol extract of *Ushaq* (UQEtOH)	5	0.19	18.6±2.1
	10	0.17	25.6±3.1
	20	0.16	30.5±2.4
	30	0.15	34.7±2.4
Aq-ethanol extract of *Ushaq* (UQAqEtOH)	5	0.20	13.8±2.3
	10	0.18	22.2±2,4
	20	0.17	27.0±2.05
	30	0.17	27.7±2.6
Ethanol extract of *Anzarūt* (AZEtOH)	5	0.21	9.7±2.4
	10	0.20	13.8±6.3
	20	0.19	19.4±2.4
	30	0.18	23.6±2.4
Aq-ethanol extract of *Anzarūt* (AZAqEtOH)	5	0.21	9.7±2.4
	10	0.20	13.8±2.3
	20	0.19	20.1±3.2
	30	0.16	30.5±2.4

All values are expressed as mean±SD (*n*=3). SD: Standard deviation

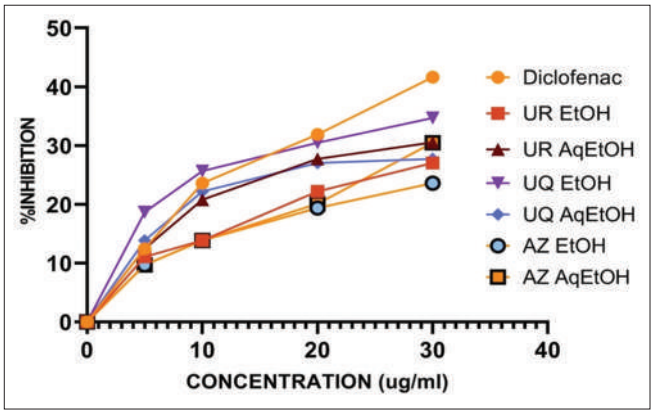

Figure 2: Effect of, *namely 'Uṣāra Raywand* (*Rheum australe* D. Don), *Ushaq* (*Dorema ammoniacum*), and *Anzarūt* (*Astragalus sarcocolla*) extracts on red cell membrane lysis

may occur in chronic inflammatory phenomena and albumin denaturation was observed in rats with inflammatory lesions. The insoluble denatured protein might be the cause of inflammatory changes. Heat-denatured protein can act as an autoantigen and can provoke delayed hypersensitivity.[11] As a result, a substance's capacity to prevent protein denaturation indicates that it has anti-inflammatory potential.

In protein denaturation assay, the egg white is taken as a source of protein. It was denatured by heat treatment in the presence of various gum resin extracts and their protein inhibition activity was assessed.

The hypotonic solution has a hemolytic effect. Hemolysis occurs when there is an accumulation of excessive fluid in the cells through osmosis against the concentration gradient, resulting in rupture of the erythrocyte membrane. The membrane of lysosomes is similar to the RBC membrane. Lysosomal contents are capable of inducing inflammation, conversely, the substances that stabilize lysosomes include

many that are well-known for their anti-inflammatory effects.[12] Lysis of the cell membrane results in the leakage of hydrolytic enzymes into the tissue can be prevented by membrane stabilization. As a result, substances that have the capacity to prevent rupture of RBC membrane indicate their anti-inflammatory potential.

In the RBC membrane stabilization essay, Sheep RBCs are taken and their membrane stabilizing activity is assessed by various extracts of gum resins.

Present studies show anti-inflammatory effects in protein denaturation assay in a dose-dependent manner in various extracts of gum resins but *'Uṣāra Raywand* extracts have shown comparable effects with the Standard drug. Selected gum resins do not show comparable results with standard drug in the RBC membrane stabilizing method. All the selected gum resins are acidic in nature so it can be presumed that it is not effective in stabilizing the RBC membrane and it is inferred that there might be some other mechanism of action of these drugs in exhibiting anti-inflammatory effects. Further physicochemical and phytochemical studies have also been performed to understand the nature of gum resins chemically and their probable relation to anti-inflammatory effects.

Conclusion

In the present study, we have tried to understand the mechanism of inflammation through *in vitro* studies of selected crude gum resins. The findings of this study indicated that the extracts of gum resin *Ushaq*, *Anzarūt* and *'Uṣāra Raywand* exert anti-inflammatory activity. The exhibition of anti-inflammatory activity may be due to the presence of various plant metabolites present in the gum resins. Currently, there are no specific markers for inflammation, therefore, there is a need to investigate the mechanism of action through *in vitro studies* of these gum resins to find out the mechanism of action of inflammation and to isolate and characterize the different plant metabolites and understand the probable association between plant metabolite and the inflammatory pathways.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Case Report

Effect of *Ravghan-i-Bādām* as *Quṭūr-i-Anf* (Nasal Drops) along with Oral Unani Formulations, in Sneezing (*Uṭās*'): A Case Study

Abstract

Sneezing may be defined as a spasmodic expiration preceded by one or more spasmodic inspirations. Sneezing is an almost universal daily phenomenon as a reflex to evacuate irritants from the nasal cavities. In the Unani system of medicine, *Uṭās* (sneezing) is a beneficial action that occurs naturally, and it is a specific action of the brain that occurs to expel or remove some phlegm or another harmful substance, pushing it out through the nose with the inhaled air and sometimes also through the mouth. "*Uṭās*" means "frequent sneezing." In this case report, a female patient aged 16 years visited the outpatient department of RRIUM, Srinagar on August 11, 2024, with the complaint of persistent sneezing for the past 6 months. The sneezing occurred daily and was associated with redness and watering of the eyes. The patient was treated with *Ravghan-i-Badam* as nasal drops (*Quṭūr-i-Anf*) along with *Ḥabb-i-Shifā'* and *Itrīfal Ustukhuddus* for 21 days with three follow-ups excluding baseline. In this study, a significant relief in sneezing was noted at the end of the study. This study concluded that *Ravghan-i-Badam* as a nasal drop (*Quṭūr-i-Anf*) has a significant effect on relieving chronic sneezing.

Keywords: *Quṭūr-i-Anf, reflex, rhinitis, sneezing, Unani formulations, Uṭās'*

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Introduction

Sneezing is a protective reflex triggered by stimulation of the upper respiratory tract, specifically the nasal cavity. Although a common occurrence worldwide, little is known about this reflex action, which can indicate a variety of medical conditions.[1] In humans, mechanical stimulation and a wide range of chemical irritants applied to the nasal mucosa can cause sneezing. Inhaling drugs like histamine into the nose and secreting nasal mucus are both effective stimuli.[2] Sneezing involves an initial deep inspiration followed by forced expiration against a closed glottis. The glottis then opens, allowing for a forced exhalation of air. The sneeze and cough share many characteristics, with the exception that the pharynx appears to be constricted during the expulsive phase, and forced expulsion occurs through both the nose and mouth. The sneeze provides an effective clearance mechanism for the nose and nasopharynx, whereas the cough contributes a similar clearance mechanism for the larynx and lower airway.[3] Sneezing reflexes are frequently associated with rhinitis, whether or not it is allergic. A full stomach (snatiation reflex), psychogenic or central nervous system disorders, physical stimulants of the trigeminal nerve, ACHOO syndrome, and sexual desire can all induce sneezing.[1]

There are two stages to the sneezing reflex. After chemical or physical irritants stimulate the nasal mucosa, the first phase is known as the nasal or sensitive phase. While some of the trigeminal nerve's distal branches disperse throughout the nasal mucosal epithelium, many of them end in the facial skin, where they transmit tactile, pain, and temperature sensations.[3] These branches are small-diameter myelinated sensory fibers that end in receptor endings. While some of these receptors are sensitive to mechanical and tactile stimuli, others are activated by chemical stimuli.[3] The trigeminal nerve's anterior ethmoidal, posterior nasal, infraorbital, and ophthalmic branches all carry afferent neural stimuli to the trigeminal ganglion.[4] The sneezing center in the lateral medulla receives the stimuli via the trigeminal ganglion.[5] Once a threshold is reached and a critical number of inspiratory and expiratory neurons have been recruited, the second phase, also

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known as the efferent or respiratory phase, starts. This includes closing the eyes, taking a deep breath, and then forcing out the air while the glottis first closes and the intrapulmonary pressure rises. An explosive outflow of air through the mouth and nose is caused by the abrupt dilatation of the glottis, which removes irritants and mucosal debris.[6] The trigeminal nerve is important for the nociceptive sensory supply of the nasal mucosa in addition to the face, oral mucosa, cornea, and conjunctiva. Itching and sneezing are generated by the activation of trigeminal afferent nerve terminals in the nasal mucosa.[7]

In the Unani system of medicine, *Uṭās* (sneezing) is a beneficial action that occurs naturally and it is a specific action of the brain that occurs to expel or remove some phlegm or another harmful substance, pushing it out through the nose with the inhaled air, and sometimes also through the mouth.[8] Sneezing for the brain is similar to the benefit of coughing for the lungs, nearby airways, and related organs. During sneezing the brain compresses external air to expel the harmful substances to ensure that the body and internal organs that are filled with necessary air remain filled and that the harmful phlegm along with the essential air is not expelled.[9] A moderate amount of sneezing is beneficial as it relieves the heaviness in the head, helps to expel retained waste, facilitates childbirth, and assists in expelling the placenta. At the end of the illness, sneezing is considered a sign of improvement.[10]

However "*Uṭās*" means "frequent sneezing."[11] Frequent sneezing can lead to many problems that's why some scholars say that excessive sneezing can lead to severe nose bleeding (epistaxis) and at times, it can affect the tissues and lead to conditions so severe that it weakens strength and the head becomes heavy, filled with air and other substances.[9,12] This is due to the accumulation of (thick material) in the brain, which can vary in intensity, sometimes being less and at other times more. These are either produced by the thick humor in the brain itself or arise from other organs in the brain.[10]

The main causes are walking in the sun, exposure to dust, or inhaling irritating substances like tobacco or pepper causes frequent sneezing.[13] It is often associated with cold and flu conditions. Irritation in the nose due to exposure to dust, smoke, and gases affects the brain, are causes of frequent sneezing.[8]

Case Report

A 16-year-old female patient visited the outpatient department of RRIUM, Srinagar, on August 11, 2024, with a history of persistent sneezing for the past 6 months. The sneezing occurred daily and was associated with redness and watering of the eyes. These symptoms significantly disrupted her daily routine and caused social awkwardness, affecting her quality of life. There was no history of diabetes, hypertension, or other significant medical conditions. The patient had a history of taking antihistaminic, anti-inflammatory medication for the

Table 1: Ingredients of *Ḥabb-i-Shifā*

Name of the drug	Botanical name	Part used	Quantity of drug
Tukhm-i-Jauzmasil	*D. stramonium* L.	Seed	6 parts
Rewand Chini	*R. emodi* Wall.	Root	4 parts
Zanjabīl	*Z. officinale* Rosc.	Rhizome	2 parts
Ṣamagh-i-Arabi	*A. nilotica* (L.) Wild. Ex Del.	Gum	2 parts

Prepared as per NFUM 2006.[14] *D. stramonium: Datura stramonium, R. emodi: Rheum emodi, Z. officinale: Zingiber officinale, A. nilotica: Acacia nilotica*

Table 2: Ingredients of *Iṭrīfal Ustukhuddus*

Name of the drug	Botanical name	Part used	Quantity of drug (g)
Post-i-Halela Zard	*T. Chebula* (Gaertn.) Retz.	Bark	100
Post-i-Halela Kābuli	*T. Chebula* (Gaertn.) Retz.	Bark	100
Halela Siyāh	*T. Chebula* (Gaertn.) Retz.	Bark	100
Post-i-Balela	*T. bellerica* Roxb.	Bark	100
Amla	*P. emblica* L.	Fruit	100
Gul-i-Surkh	*R. damascene* Mill.	Flower	100
Ustukhuddus	*L. stoechas* L.	Whole plant	100
Bisfayej	*P. vulgare* L.	Root	100
Aftimun	*C. reflexa* Roxb.	Whole plant	100
Kishmish	*V. vinifera* L.	Fruit	100
Ravghan-i-Badam	*P. amygdalus* Batsch.	Oil	Q.S.
Qand Safed	Sugar		100

Prepared as per the Khan and Qarābādīn-I-Azam, 2006.[15] *T. Chebula: Terminalia Chebula, P. emblica: Phyllanthus emblica, L. stoechas: Lavandula stoechas, P. vulgare: Polypodium vulgare, C. reflexa: Cuscuta reflexa, V. vinifera: Vitis vinifera, P. amygdalus: Prunus amygdalus, T. bellerica: Terminalia bellerica, R. damascene: Rosa damascene*

Table 3: Ingredients of *Ravghan-i-Badam*

Name of the drug	Botanical name	Part used	Quantity of drug
Maghz-i-Badam Shirīn	*P. amygdalus* Batsch.	Kernel	Q.S.

Oil prepared as per NFUM 2006.[14] *P. amygdalus: Prunus amygdalus*

Table 4: Arbitrary sneezing frequency score

Sneezes per day	Score	Category
0–2	0	No sneezing
3–10	1	Mild sneezing
11–20	2	Moderate sneezing
21–40	3	Severe sneezing
>40	4	Very severe sneezing

past 3–4 months but there was no relief in sneezing. The patient gave a normal menstrual history with a record of duration and frequency of cycles.

On general examination, the patient appeared uncomfortable, though well-oriented. The build of the patient was average. The vitals were stable, pulse 75/min, temperature 98.2°F, respiratory rate 16/min, and blood pressure 120/80 mm Hg at baseline. Systemic examination revealed no abnormalities except for nasal irritation and watery eyes suggestive of conjunctival involvement. The respiratory system was clear, with no wheezing or abnormal breath sounds. The clinical presentation is consistent with allergic rhinitis, potentially triggered by environmental allergens. After taking proper history, and systemic and local examination, the patient was diagnosed as a *Uṭās*'/sneezing patient.

Intervention

Before starting the treatment, the patient was explained about the Unani treatment and duration, and an informed consent form was signed. Apart from the treatment, nonpharmacological measures, including allergen avoidance, use of air purifiers, and regular cleaning of bed linens were also advised.

The patient was given *Ḥabb-i-Shifā* 1 tablet twice a day,see Table 1. for ingredients.[15] *Iṭrīfal Ustukhuddus* 5 g (see Table 2 for ingredients of the compound[15] provided from hospital pharmacy government supply, made up of IMPCL) with warm water at night, and *Ravghan-i-Badam* (Hamdard Company) [see Table 3] as nasal drops (*Quṭūr-i-Anf)* 2–4 drops at night for 21 days.

Assessment of sneezing

Symptom improvement was assessed during and after treatment. Objective assessment was done by assessing the frequency of sneezing and scoring it through Arbitrary Sneezing Frequency Score at baseline (day 1), 1st follow-up (day 7), 2nd follow-up (day 14), and 3rd follow-up (day 21) [see Table 4].

Observations and Results

The frequency of sneezing was assessed through Arbitrary Sneezing Frequency Score at baseline, 7th day (1st follow-up), 14th day (2nd follow-up), and 21st day (3rd follow-up).

Thus, the study showed that both the duration and frequency of sneezing reduced significantly at the end of the treatment period showcasing the beneficial effects of the intervention.

Discussion

Sneezing, a protective reflex triggered by irritation of the nasal mucosa due to allergens, irritants, or infections, can be effectively managed using Unani formulations such as *Ḥabb-i-Shifā***,** *Iṭrīfal Ustukhuddus***,** and *Ravghan-i-Badam***.** These formulations work through synergistic mechanisms, including anti-inflammatory, antiallergic, and mucolytic actions, to address the underlying causes of sneezing.

The formulation contains ingredients with anti-inflammatory, antiallergic, and mucolytic properties. *Tukhm-i-Jauzmasil* (*Datura stramonium*)[16] reduces nasal congestion and hypersensitivity, while *Rewand Chini* (*Rheum emodi*)[17,18] evacuates the morbid matter and detoxifies and eases irritation. *Zanjabīl* (*Zingiber officinale*)[19] soothes the nasal passages with its anti-inflammatory and antioxidant effects, and *Ṣamagh-i-Arabi* (*Acacia nilotica*) reduces mucus secretion and inflammation, providing relief from sneezing and nasal irritation.

Iṭrīfal Ustukhuddus balances the humors and addresses sneezing by detoxifying and regulating mucus. *Terminalia chebula*[20] and *Terminalia bellirica* help clear excess mucus, while *Amla*[21] boosts immunity and reduces hypersensitivity. *Rosa damascene*[22] calms nasal irritation, and *Lavandula stoechas*[23] soothes hyperactive reflexes like sneezing. *Cuscuta reflexa*[24] manages allergies, and *Vitis vinifera*[25] provides antioxidants to soothe the mucosa. *Prunus amygdalus*[26] lubricates and nourishes the nasal membranes, reducing dryness and irritation. These ingredients work together to relieve sneezing and nasal discomfort.

Maghz-i-Badam Shirīn (*P. amygdalus*),[26,27] or almond oil, has emollient and anti-inflammatory properties that help moisturize the nasal mucosa, alleviating irritation caused by dryness or allergens. It forms a protective layer over the nasal passages, reducing the impact of irritants and providing soothing relief.

Together, these formulations address the root causes of sneezing by reducing inflammation, modulating immune responses, clearing mucus, and calming nasal reflexes, offering a holistic and natural approach to symptom relief.

Conclusion

This case report illustrates the potential effectiveness of Unani medicinal formulations, specifically *Ḥabb-i-Shifā*, *Iṭrīfal Ustukhuddus*, and *Ravghan-i-Badam* (*Qaṭūr-i-Anf*), in managing persistent sneezing (*Uṭās'*) and associated symptoms such as nasal irritation and conjunctival involvement. The comprehensive treatment approach, integrating both pharmacological remedies and nonpharmacological strategies such as allergen avoidance, demonstrated a notable improvement in the patient's condition. The active ingredients within these formulations, which possess anti-inflammatory, antiallergic, and mucolytic properties, target key pathophysiological mechanisms of sneezing, including nasal congestion, hypersensitivity, and excessive mucus production. Subjective assessment using visual analog scal and objective assessment using the Arbitrary Sneezing Frequency Score confirmed the reduction in sneezing duration and frequency, further supporting the therapeutic benefits of the treatment.

These findings suggest that Unani medicine, through its synergistic formulations, offers a viable alternative to conventional treatments for allergic rhinitis and chronic sneezing. However, further large-scale, controlled clinical trials are essential to evaluate the long-term safety, efficacy, and broader applicability of these Unani interventions in managing sneezing and other related respiratory disorders.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given his consent for images and other clinical information to be reported in the journal. The guardian understands that names and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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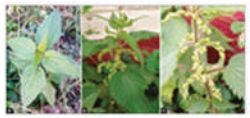

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