

Unani drug, *Jadwar* (*Delphinium denudatum* Wall.)—A review

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Jadwar, root of *Delphinium denudatum* Wall. is an important central nervous system (CNS) active drug of Unani System of Medicine. In various classical texts, it has been mentioned to be sedative, analgesic, brain and nervine tonic, and is recommended for various brain and nervine disorders like epilepsy, tremors, hysteria, atony, numbness, paralysis, morphine dependence, etc. The present paper reviews chemical and pharmacological investigations carried out on *Jadwar* drug during recent times.

Keywords: Anticonvulsant activity, Antidote activity, *Delphinium denudatum*, *Jadwar*, Review, Unani medicine

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Delphinium sp. (Larkspurs), an annual or perennial, erect and hardy ornamental herbs are grown for their beautiful flowers. *Delphinium ajacis*, *D. consolida*, *D. elatum*, *D. grandiflorum*, *D. laxiflorum*, *D. montanum*, *D. palmatifidum*, *D. peregrinum*, *D. bescens*, *D. staphisagria* and *D. triste* are used medicinally in Europe, of which, 15 species occur in India, out of which *Delphinium denudatum* Wall. (Ranunculaceae) is used medicinally¹⁻⁴. The generic name of *Jadwar* is derived from a Greek word, which means Dolphin, as the nectary resembles the figure of a dolphin⁵. The word *Jadwar* is Arabic form of Persian *Zadwar*, which means the great purifier or antidote. The Persian name *Mah-Parvin* (moon and pleades) is probably given to this plant as it blossoms in the beginning of summer when the pleades rise⁶. In India, *Jadwar* was named as *Narbasi* / *Nirbisi* due to its antidotal properties². *Nir* means to oppose or to remove and *Bisi* means *Bis* or *Vish* (poison). *Bis* of *Nirbisi* are also used for *Bish* or aconite, as *Jadwar* is the antidote for aconite poisoning⁸. Antila, Balootul arz, *Jadwar*, Mahferfin, *Zadwar*, *Jadwar*, *Nirbishi*, *Nirbisi*, *Nirvisi*, *Apavisha*, *Avisha*, *Nirvisha*, *Nirvisi*, and *Vishalakarani* are some of its vernacular names^{3,4,6}. *Jadwar* (*Delphinium denudatum*) commonly occurs on the grassy slopes in western temperate Himalayas, from Kumaon to Kashmir at an

altitudes of 2,438.4-3,657.6 m. It also occurs in Punjab, Sirmoor and Lahore^{1,3,7,9}.

The rhizome is blackish brown, externally marked by longitudinal wrinkles and bears numerous small circular scars that are the remains of lateral roots (Fig. 1). At the crown there is a scaly leaf bud^{6,7,10}. Flowers few scattered, pale blue, seed small and endospermic^{1,10}. It is externally covered by a suberized metaderm. The metaderm comprises of brown tubular cells having somewhat irregular arrangement¹⁰. Root parenchymatous cells contain starch grains, which mostly occur in groups. Fibers, calcium oxalate and cork cells are absent. The drug powder appears light yellow in colour. When treated with NaOH, prepared in methanol, and observed under ultraviolet light, it became yellowish green^{11,12}. The quantity of reducing sugars in aqueous extract of *Jadwar* was $13.74 \pm 0.54\%$. Powdered drug comprises mostly of fragments of xylem vessels having scleriform thickenings, a few parenchyma and lot of small rounded bodies, i.e. starch grains and few prismatic crystals. Powder is semi-fine in nature and grey or ash coloured. The taste is very bitter without any significant odour¹⁰.

Phytochemistry

Presence of alkaloids like delpho-curarine, staphisagrine, delphinine, condelphine, isotalatizidine, denudatine, talatizidine, hetisinone, delnudine, delnuline, vilmorri anonymouse, panicutine, 3-

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hydroxy-2-methyl-4H-pyran-4-one, diterpenoid alkaloid 8, acetylhetero-phyllisine and diterpenoid alkaloid $C_{25}H_{39}NO_6$ identical with condelphine, have been reported^{1,3,13-21}. Sterols and fatty acids have been detected in *Jadwar* roots²². Oil content (1.47%) obtained from *Jadwar* root yielded, unsaponifiable matter (17.75%), and saponifiable matter (82.25%). Alcoholic extract of defatted powdered *Jadwar* revealed the presence of maltose, sucrose, glucose and fructose. Direct thin layer chromatography (TLC) showed only monooxygenated acids, while argentation TLC showed the spots corresponding to saturates, monoene, diene and triene, and absence of *trans*-unsaturated components. The gas liquid chromatography (GLC) analysis showed that saturated and unsaturated fatty acids were present in the ratio of 1:3 (ref. 23). Sugar, protein, phenol, starch, iron, zinc, calcium, magnesium, and potassium are also present in *Jadwar* root¹⁰. Delphinidin, an anthocyanidin has also been reported²⁴.

Therapeutic activity

In classical books of Unani medicine, *Jadwar* is referred as antipyretic, antiseptic, vulnerary, detergent, diuretic, exhilarant, resolvent, anti-inflammatory, demulcent, sedative, analgesic, aphrodisiac, antidote, cardiotoxic, general tonic, brain and nervine tonic and tonic for viscera, teeth, stomach, vision and principal organs. *Jadwar* has been recommended for the treatment of paralysis,

epilepsy, facial palsy, insanity, mania, hysteria, atony, migraine, numbness, tremors, infantile convulsions, aconite poisoning, snake bite, scorpion sting, opium addiction, arthritis, cardiac weakness, palpitation, rheumatism, toothache, all kinds of pain, leucoderma and for improving skin complexion^{4, 8, 25-40}. *Khameera Gaozaban Ambari Jadwar Ood Saleeb Wala, Habb-e Jadwar, Habb-e Jawahar* and *Jawahar Mohra, Marham-e Jadwar, Zimad-e Warm-e Lozatain* are some of the formulations of Unani System of Medicine^{10, 35}.

Adulterants and varieties of *Jadwar*

Jadwar is adulterated with the root of *Beesh* (aconite), a poisonous herb root that may cause death¹¹. Some roots, similar to *Jadwar* in appearance, are sold as adulterants^{6,8,31,37,41}. Some researcher has mentioned four types of *Jadwar*, viz white, violet, black and yellow²⁹. The people of Khata call yellow type *Karbi* and violet type *Barbi*. The rest two types, i.e. black and white are of Indian origin. The best variety, called *Jadwar Khatai* is violet in colour and larger in size³⁶. It is harder and heavier, conical in shape and leaves violet colour on paper when rubbed with water. The black Indian variety of *Jadwar* found in Kashmir is better than yellow and white varieties. White varieties are smaller in size, softer and white, both on inside and outside. Black variety, found in a city of 'Undlus' (Spain) called *Chalpapi* and *Nitla*, is bitter in taste.

Other researcher has reported following five varieties of *Jadwar*^{8,27,35,37,38}:

(i) Externally black, internally reddish violet, scorpioid in shape, taste sweet first and bitter afterwards is called *Jadwar Khatai* as it grows in the hills of Khata.

(ii) Yellowish black on both inside and outside, scorpioid in shape, and bitter in taste is inferior to *Jadwar Khatai*.

(iii) Black on both sides, inside and outside. On rubbing it leaves a blue tint. It is bitter in taste and inferior to second variety. The second and third varieties come from Tibet, Nepal, Morong and Rangpore.

(iv) Black in colour, olive sized and bitter in taste is found in Deccan hills, and

(v) Black in colour, 20-23 cm long, soft and very bitter in taste, called *Antila* is found in Spain. It often grows in the vicinity of *Beesh* (Aconite), and has an inhibitory effect on the growth of *Beesh*. It also mitigates the toxicity of *Beesh*.



Fig. 1 Rhizome of *Delphinium denudatum* Wall

Another reported variety growing in Spain is called *Faheque*³¹. It is white in colour, sweet in taste and has a pleasant fragrance. It also grows near *Bachnak* (Aconite). Fifth and sixth types are respectively given the name *Antila Sauda*, i.e.; *Black Antila* and *Antila Baiza*, i.e. *White Antila*. The best reported variety is *Jadwar Khatai*^{8,29,31,33,36}.

Ancient Unani texts distinguished *Jadwar* tubers from *Beesh* as both grow together. *Beesh* is smaller, reddish and its taste is first sweetish, but soon becomes acrid, accompanied with a tingling sensation and numbness. If *Jadwar* is taken afterwards, this sensation disappears. Strong *Beesh* may also produce inflammation, even blisters on the tongue, while *Jadwar* is free from such adverse effects. *Jadwar* is bitterer than *Beesh*^{8, 35, 37}. Botanical source of genuine *Jadwar* is the root of *Delphinium denudatum*⁴². False drug is rough, uneven and shriveled externally due to boiling in some coloured substances, while the genuine *Jadwar* is smooth and clear externally. The false drug is slightly acrid instead of being intensely bitter^{6, 8, 31, 37}. Insects on account of its bitter principle seldom attack *Jadwar*⁴³.

Pharmacological activity

Ethanol extract showed antibacterial activity against *Corynebacterium diphtheriae*, *Proteus vulgaris*, *Salmonella typhi*, and *Klebsiella pneumoniae*⁴⁴. Organic solvent extracts also showed antimicrobial properties⁴⁵. Antifungal activity was determined by agar tube diffusion method against human pathogenic fungi^{18,59}. Ethanol extracts showed antifungal activity against *Stachybotrys atra*, *Trichophyton longifusus*, *Curvularia lunata*, *Drechslera rostrata*, *Epidermophyton floccosum*, *Microsporum canis*, *Nigrospora oryzae* and *Ganoderma applanatum*. Compounds viz 8-acetylheterophyllisine, and Vilmorri anonymous showed antifungal activity against *Allescheria boydii*, *E.floccosum*, and *Aspergillus niger*. Compound, Panicutine exhibited antifungal activity against *Allescheria boydii*, *Stachybotrys atra*, *Pleurotus ostreatus*, *Nigrospora oryzae*, *Dutarium rotatum*, and *Aspergillus niger*⁴⁶. It showed protective activity in myocardial metabolism against Russels viper's envenomation in rats⁴⁷. The aqueous extract showed radioprotective activity against radiation induced changes in rat myocardium⁴⁸.

Alcoholic and aqueous extract inhibited the experimental convulsions in rats^{49 - 51}. Oily fraction of

the aqueous extract showed better anticonvulsive effect than aqueous extract against pentylenetetrazole and bicuculline induced maximal electroshock test in hippocampus⁵². Ethanol extract and aqueous fraction of *Jadwar* root showed anticonvulsant activity against maximal electroshock and subcutaneous pentylenetetrazole, bicuculline, picrotoxin and strychnine tests. FS-1 sub-fraction of an aqueous fraction also showed anticonvulsant activities in maximal electroshock test and subcutaneous pentylenetetrazole, bicuculline, picrotoxin-induced seizures⁵³. Aqueous fraction showed *in vitro* inhibition of pentylenetetrazole and bicuculline-induced epileptiform activity in rat hippocampal pyramidal neurons. These anticonvulsant compounds from aqueous fraction possibly interact with GABA (A) receptor to produce blockade of epileptiform activity⁵⁴. Study of the effect of FS-1 sub-fraction on hippocampal pyramidal neurons showed anti convulsant effect⁵⁵. The aqueous fraction blocked sustained repetitive firing in cultured neonatal rat hippocampal pyramidal neurons suggesting presence of potent anticonvulsant compounds⁵⁶.

Jawahar Mohra, a compound Unani preparation, containing *Delphinium denudatum* Wall. has shown anti-stress activity of non specific type against diverse stressors probably due to adaptogenic activity of the preparation⁵⁷. *Delphinium denudatum* extract showed significant reduction in counted signs as well as checked signs of morphine withdrawal in morphine⁵². The alcoholic extract attenuated the withdrawal symptoms of moderately morphine dependent rats⁵⁸. The aqueous extract of *Delphinium denudatum* roots showed a significant effect against morphine induced tolerance and dependence in mice⁵⁹. Alcoholic extract significantly reduced the aggregate scores for all parameters in morphine withdrawal syndrome by central action and thus may prove to be an alternative remedy in morphine de-addiction⁶⁰. The aqueous extract showed consistent and significant central depressant activity⁵⁹. Alcoholic extract caused some CNS depression and demonstrated a dose dependent antinociceptive effect in thermal and chemical models of analgesia. Pretreatment with naloxone did not alter the analgesic effect suggesting that some mechanism other than opioid is involved in the action⁶¹. Aqueous extract was reported to have hepato-protective activity on experimental carbon tetrachloride induced liver damage in rats⁶². Organic solvent extracts showed immuno-modulating properties⁴⁵.

Conclusion

The scientific analysis of *Jadwar* proves many of the activities mentioned in Unani literature. Further investigations are needed to find out the mechanism of action, active principle(s) and utility of *Jadwar* in clinical practice. Since, the preliminary investigations show promising results against neurological disorders, this aspect needs to be thoroughly investigated so that it can be established as a standard drug.

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