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 nervous 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


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 medicinally 1-4. 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 pleiades) is probably given to this plant as it blossoms in the beginning of summer when the pleiades rise6. In India, Jadwar was named as Narbasi / Nirbisi due to its antidotal properties2. Nir means to oppose or to remove and Bisi means Bish or Vish (poison). Bis of Nirbisi are also used for Bish or aconite, as Jadwar is the antidote for aconite poisoning6. Antila, Balootul arz, Jadwar, Mahferfin, Zadwar, Jadwar, Nirbishi, Nirbisi, Nirvisi, Apavisha, Avisha, Nirvisha, Nirvishi, and Vishalakaran are some of its vernacular names3,4,6. 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 Lahore1,3,7,9.

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 bud6,7,10. Flowers few scattered, pale blue, seed small and endospermic1,10. 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 green11,12. The quantity of reducing sugars in aqueous extract of Jadwar was 13.74 ± 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-
hydroxy-2-methyl-4H-pyran-4-one, diterpenoid alkaloid 8, acetylhelhetero-phyllisine and diterpenoid alkaloid C25H39NO6 identical with condelphine, have been reported\(^1,3,13-21\). Sterols and fatty acids have been detected in Jadwar roots\(^22\). 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 root\(^10\). Delphindin, an anthocyanidin has also been reported\(^24\).

**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, cardiotonic, 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 death\(^11\). 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 yellow\(^26\). 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 size\(^16\). 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.
Another reported variety growing in Spain is called \textit{Aspergillus niger}^{46}. 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 \textit{Jadwar Khatai}^{8,29,31,33,36}.

Ancient Unani texts distinguished Jadwar tubers from \textit{Beesh} as both grow together. \textit{Beesh} is smaller, reddish and its taste is first sweetish, but soon becomes acrid, accompanied with a tingling sensation and numbness. If \textit{Jadwar} is taken afterwards, this sensation disappears. Strong \textit{Beesh} may also produce inflammation, even blisters on the tongue, while \textit{Jadwar} is free from such adverse effects. \textit{Jadwar} is bitterer than \textit{Beesh}^{8,35,37}. Botanical source of genuine \textit{Jadwar} is the root of \textit{Delphinium denudatum}^{52}. False drug is rough, uneven and shriveled externally due to boiling in some colored substances, while the genuine \textit{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 \textit{Jadwar}^{43}.

\textbf{Pharmacological activity}

Ethanolic extract showed antibacterial activity against \textit{Corynebacterium diphtheriae}, \textit{Proteus vulgaris}, \textit{Salmonella typhi}, and \textit{Klebsiella pneumoniae}^{44}. Organic solvent extracts also showed antimicrobial properties^{45}. Antifungal activity was determined by agar tube diffusion method against human pathogenic fungi^{18,59}. Ethanolic extracts showed antifungal activity against \textit{Stachybotrys atra}, \textit{Trichophyton longisus}, \textit{Curvularia lunata}, \textit{Drechlera rostrata}, \textit{Epidermophyton flocosum}, \textit{Microsporum canis}, \textit{Nigrospora oryzae} and \textit{Ganoderma applanatum}. Compounds viz 8-acetylheterophyllisine, and \textit{Vilmorri anonymouse} \textit{Ganoderma applanatum}, \textit{Compounds viz 8-acetylheterophyllisine}, and \textit{Vilmorri anonymouse} showed antifungal activity against \textit{Allescheria boydii}, \textit{E.flocosum}, and \textit{Aspergillus niger}. Compound, \textit{Panicutine} exhibited antifungal activity against \textit{Allescheria boydii}, \textit{Stachybotrys atra}, \textit{Pleurotus ostreatus}, \textit{Nigrospora oryzae}, \textit{Dutarium rotatum}, and \textit{Aspergillus niger}^{46}. It showed protective activity in myocardial metabolism against \textit{Russel's viper's envenomation in rats}^{47}. The aqueous extract showed radioprotective activity against radiation induced changes in \textit{rat myocardium}^{48}.

Alcoholic and aqueous extract inhibited the experimental convulsions in \textit{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 hippocampus^{52}. Ethanolic extract and aqueous fraction of \textit{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 seizures^{53}. 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 activity^{54}. Study of the effect of FS-1 sub-fraction on hippocampal pyramidal neurons showed anti convulsant effect^{55}. The aqueous fraction blocked sustained repetitive firing in cultured neonatal rat hippocampal pyramidal neurons suggesting presence of potent anticonvulsant compounds^{56}.

\textit{Jawahar Mohra}, a compound Unani preparation, containing \textit{Delphinium denudatum} Wall. has shown anti-stress activity of non specific type against diverse stressors probably due to adaptogenic activity of the preparation^{57}. \textit{Delphinium denudatum} extract showed significant reduction in counted signs as well as checked signs of morphine withdrawal in morphine^{52}. The alcoholic extract attenuated the withdrawal symptoms of moderately morphine dependent rats^{58}. The aqueous extract of \textit{Delphinium denudatum} roots showed a significant effect against morphine induced tolerance and dependence in mice^{59}. 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-addiction^{60}. The aqueous extract showed consistent and significant central depressant activity^{59}. 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 action^{61}. Aqueous extract was reported to have hepatoprotective activity on experimental carbon tetrachloride induced liver damage in rats^{62}. Organic solvent extracts showed immuno-modulating properties^{45}.

\textbf{Conclusion}
The scientific analysis of Jadwars 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 Jadwars 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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