IJBPAS, April, 2023, 12(4): 1770-1780

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

PHYTOCHEMISTRY, TRADITIONAL USES AND BIOLOGICAL ACTIVITIES OF *IRSA* (*IRIS ENSATA* THUNB.): A MULTI POTENT UNANI MEDICINE

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Received 12th June 2022; Revised 20th July 2022; Accepted 9th Sept. 2022; Available online 1st April 2023

https://doi.org/10.31032/IJBPAS/2023/12.4.7076

ABSTRACT

The last few decades have observed a change in perspective regarding therapeutic approach to medicine; as a result the demand of herbal drugs has seen an exponential increase worldwide. More and more research is being performed to appraise the safety and efficacy of such drugs, in order to achieve comprehensive cure for ailments. *Irsa*, the dried root of *Iris ensata* Thunb. of family Iridaceae is used since ancient times in Unani system of medicine for various illnesses. Significant evaluation was carried out of Unani manuscripts/traditional/scientific literature, present and previous research/review papers and databases such as Wiley Online Library, Science-Direct, etc to extract maximum information of *Irsa*. On exploration of its phytochemistry, flavonoids, isoflavonoids, glycosides, phenolics, tannins, and other components were found to be potential bio-compounds and active metabolites responsible for its multipotent activities, specifically its bronchodilator, concoctive and deobstruent actions. The oil extracted from the drug is also found to be equally beneficial.

This, review paper aims to highlight the comprehensive aspect of *Irsa*, keeping in view of its temperament, medicinal properties and therapeutic use; to signify its efficacy in the treatment of wide

range of diseases as mentioned in Unani system of medicine and also to explore its phytochemistry and biological activities. Moreover, this is the first study on medicinal aspect of *Irsa* which focuses on the above stated areas in the light of Unani concept.

Keywords: *Irsa*, *Iris ensata* Thunb., Unani medicine, Bronchodilator, Concoctive

1. INTRODUCTION

The herbal drugs have an added advantage as they provide prevention as well as treatment of any disease. Their reliance and acceptance lies in the fact that their source of origin is nature based, and they are safe, efficacious and cost effective **[1]**. The Unani system of Medicine (USM), at present is popular in many countries of Arab and Asia, and is also accepted by World Health Organization as an alternative system of medicine **[2, 3]**. It is a broad medical system, which thoroughly deals with the numerous states of disease and health. It offers promotive, preventive, curative, and rehabilitative healthcare. The basic fundamental of USM is that the supreme power of our body is 'Medicatrix Naturae' (*Ṭabı'at Mudabbira -i- Badan*). It commands all the normal physiological functions of the body, produces resistance against any disease, and simultaneously stimulates natural healing. The Unani system of medicine incorporates many single and compound drugs that attenuate different pathological states of the body, accordingly. The source of origin of single drugs is mainly plant, mineral, and animal; yet, plant origin drugs are used predominantly. Even though any single drug comprises of diverse pharmacological properties, each drug has some main or chief action based on its active metabolite and temperament **[4]**. The highest percentage of these active constituents is covered by alkaloids, flavonoids, glycoside, tannin, and phenolic compounds **[5]**.

The genus *Iris* is the largest and most complex genus of Iridaceae family. It comprises of about 300 species that originated in Mediterranean and Japan, though different species of this plant are found near the south of equator, largely distributed in and around the North Temperate Zone; up to twelve species of this genus are found pan India **[6]**.

The drug *Irsa* consists of dried roots of *Iris ensata* Thunb. of family Iridaceae. This perennial herb is found in Western Himalayas at an altitude of 1500-3000 m. It occurs throughout the year while flowering and fruiting takes place during June-September **[7]**.

The leaves are used as fodder, for thatching, matting and basket work. Moreover, the plant

is reported to give a high yield of fibre. The root is reported to possess alterative properties and is employed as an ingredient for blood purifying, and for venereal diseases. It is also useful in liver complaints and dropsy **[8,9]**. The USM incorporates its use as a bronchodilator since ancient times in various diseases of respiratory system such as *Nazla* (Coryza), *Sual* (Cough), *Ribu* (Asthma), and *Zatur Riya* (Pneumonia) **[10]**.

The standardization profile of *Irsa* has been listed in Table 1 **[7]**.

This review explores the phytochemistry and medicinal efficacy of *Irsa*, keeping in view its temperament, safety dose and therapeutic uses in Unani medicine since no such review is available which focuses on the medicinal value of this plant in the light of Unani concept.

Table 1: Standardisation profile of *Irsa* (*Iris ensata* Thunb.) [7]

Identity, Purity and strength		
1	Foreign Matter	Not more than 2%
2	Total Ash	Not more than 7%
3	Acid insoluble ash	Not more than 2%
4	Alcohol-soluble extractives	Not more than 6%
5	Water-soluble extractives	Not more than 2%

2. MATERIAL AND METHOD

The extensive literature survey for maximum information on *I. ensata* was carried out from Unani texts and medicinal plant books. The search engines such as PubMed, NCBI, Scopus, Google Scholar, Web of Science, Springer, Elsevier, Science Direct, and Academia were explored for the plant's chemical constituents, therapeutic uses and biological activities. The MeSH terms such as *Iris, Iris ensata* Thunb., *Iridaceae, Irsa* and Unani, antioxidant, antimicrobial and other activities were browsed. All relevant information up to 2022 was referred including Unani manuscripts/ traditional/ scientific books and present and previous research/review papers.

3. RESULTS

3.1 Description of the plant

Synonyms/other names

Arabic : Urooq-us-Sosan

Persian : Bekh-e-Sosan Asmanjoni, Bekh-e-Banafsha

Hindi : Irsa, Sosun

Kashmiri : Krishun, Marjal, Unarjal

Urdu : Irsa

[7, 11]

Macroscopic: The root of *Iris ensata* Thunb. is brown in color, small pieces of different shapes but usually they are elongated having

transverse wrinkles. The odour is pungent and taste is slightly bitter and aromatic **[7]**.

Microscopic: The transverse section of root shows the single layer of epidermis which consists of typical parenchymatous cells with thick outer walls. The cortical region is usually made up of several layers of rectangular to oval parenchymatous cells. Most of these cells possess oil globules with other yellowish brown contents. The endodermis is found to be attached with 4-5 layers of highly thick walled cells which are polygonal to oval in shape and they are present in somewhat compact masses. There is no cortical vascular bundle but vascular bundles are numerous and closely scattered in the pith internal to the endodermis. Vascular bundles are more or less roundish in shape on tapering to one side. Each vascular bundle consists of phloem and scattered xylem elements which are enclosed by lignified fibrous sheath of 1-3 layers of cells. The parencyhmatous cells of pith are thin walled compact and polygonal to oval in shape **[7]**.

Powder: Powder of crude drug is characterized by the presence of fragments of epidermis, cortical parenchyma and highly thick walled cells attached with endodermis, fragments of vessels and fibres. The vessels are long, lignified and generally have spiral and pitted thickenings **[7]**.

Macerate

Maceration of crude drug with concentrated HNO_3 reveals the presence of cortical parenchyma and fragments of vessels and fibers **[10]**.

Temperament (*Mizaj*)

Hot 2° Dry 2° **[12, 13]**. The freshly procured herb is relatively less intense in its temperament **[14, 15]**.

Dose (*Miqdar Khurak*)

3-5 gm **[16]**

5-7gm **[7]**

Some Unani scholars consider its dose to be 7-9gm while some assume it to be ranging from 3.5-10gm. Ibn-Sina earlier recommended its use in higher dose from 16-24gm **[17]**.

Adverse effect (*Muzir*) and its corrective (*Musleh*)

Prolong oral intake or high dose of *Irsa* adversely affects the lungs and at the same time causes nausea and vomiting. Concurrent use or admixing *Irsa* with honey (equivalent quantity) can avoid adverse impact on lungs while consumption of citric extracts (Ruboob) can prevent nausea and vomiting **[14-15, 17]**.

Substitute (Badal)

Some Unani scholars stated use of *Revandchini* (*Rheum emodi* Wall. ex Meissn) in half quantity as a substitute of *Irsa*. Moreover, for purgation of bile, it can be substituted by 96gm of camel milk and 1/3rd quantity of *Mazriyoon hindi* (*Clitoria ternatea* Linn.); while thoracic pain can be relieved by oral intake of dried extract of *Irsa* (equivalent quantity) as a substitute **[14-15, 17]**.

Unani formulation

Sharbate-Zoofa **[10,16]**, *Majoon Rahul momineen, Arqe- chobchini* **[7]**, *Zimade-Khanazeer* **[7, 10]** *Tiryaqe Farooq*, *Majoone-Murawwahul Araah* **[18]** are some of Unani pharmacopoeial preparations that incorporate *Irsa* as one of its chief component.

3.2 Pharmacological actions and therapeutic uses from Unani texts

Medicinal properties

Irsa's pharmacological actions, according to theory of Unani medicine, include *Mohallile-warm* (Resolvent), *Mulattif* (Demulcent), *Mufattih Sudad* (Deobstruent), *Munaffise-Balgham* (Expectorant), *Dafae-Tashannuj* (Anticonvulsant) **[7, 13]**, *Musakkhin* (Calorific), *Munaqqi* (cleanser), *Munzij* (Concoctive), *Jali* (Detergent), *Qabize-Khafif* (Mild Astringent), *Mujaffif* (Dessicative) **[17]**; *Mus'hil Safra wa Balgham* (Purgative-Bile and Phlegm) **[14]**, *Dafa'e- Samoom* (Antidote) **[16]** properties.

Therapeutic uses

The dried root of *I. ensata* is prescribed in Unani doctrines as a part of treatment in numerous illnesses due to its exceptional medicinal attributes as stated above. The external application of concentrated decoction softens firm/ hard swellings, lumps, cysts, acne, freckle lentigo and birth mark (*Namash).* It produces granulation tissue, dissolves foul smell, and heals abscess and fistula. Similar results are seen when *Irsa* powder is admixed with honey for local application. For oral intake, *Irsa* alone or when added with aqueous solution of acetic acid (*Sirka*) or with alcohol is found to be effective in muscular injuries, arthritis, neuralgia, paralysis, laxity, involuntary movement of muscles (*Ikhtilaj*), convulsion, shock, tremors, amnesia and memory enhancement **[17]**.

According to Ibn-Sina, *Irsa* works as sedative, and resolves chronic headache. For this, combination of *Irsa*, aqueous solution of acetic acid and rose oil is applied on head specifically on anterior fontanelle**.** This in turn causes excessive sneezing due to vasodilation **[12, 17]**.

It enhances lacrimation, and local application in the form of kohl reduces pterygium (eye

web). Its gargle and nasal drop reduces foul smell of mouth and nose, respectively while the ear drop diminishes tinnitus **[13]**.

Internal use of *Irsa*'s decoction or inner part of *Irsa* (*jirm*) works against diseases of respitatory system specifically corhyza (*Nazla*), cough (*Sual*), asthma (*Ribu*), respiratory distress, phlegmatic diphtheria, pleurisy (*Zat-ul-janb*), and pneumonia (*Zat-ur-riya*). It mainly acts here as a bronchodilator, concoctive and cough expectorant **[7]**.

Some Unani scholars find *Irsa* to be cardiac-tonic, and liver tonic. Its *Mufattih sudad* property resolves ascites and simultaneously cures jaundice. This activity is enhanced synergistically by mixing aqueous solution of acetic acid as a result it alleviates pain at the site of liver and spleen **[16]**.

It is recommended as enema and pessary against sciatica and intestinal worm infestation, respectively. It is stated that *Irsa*'s decoction is beneficial in the form of sitz bath for pain and firmness at the site of anus and uterus. The explanation for its use in various other discomfort and illnesses of uro-genital and reproductive system are also given like burning micturition, excessive ejaculation, and dystocia. It is worth noting here that decoction of 7gm *Irsa* combined with alcohol resolves uterine blockage, works as emmenogogue, while local application of *Irsa*'s paste cures numerous uterine diseases.

Moreover, the application of *Irsa*'s paste diminishes toxic effect of insect bite and snake bite **[15, 17]**.

***Irsa* oil**: The oil extracted from the root of *I. ensata* incorporates several medicinal properties. Massage of the oil relieves fatigue and diminishes tremors. The internal use of *Irsa*'s oil added with acetic acid and/or alcohol functions as antidote and rectifies rigor and chills of fever.

It is used as an emetic, and a strong purgative (30ml per orally). The oil's widespread external use as a nasal/ear drop subsides foul nasal smell, chronic corrhyza and tinnitus. Additionally, amalgamation of *Irsa* oil and olive oil (heated together) attenuates chronic deafness **[15, 17]**.

3.3 Phytochemistry

The fresh flowers of *Irsa* contain 0.05-0.1% of an anthocyanin pigment, ensatin chloride ($C_{38}H_{41}O_{19}Cl.{}_{10}H_2O$; M.P. 175° decomp.). This pigment on hydrolysis yields glucose, malvidin chloride and *p*-hydroxy cinnamic acid (the wealth of india). Moreover, Ceryl alcohol was isolated from roots while ferulic, p-coumaric, vanillic, p-hydroxy benzoic acids, orientin and homo-orientin from aerial parts of *I. ensata* **[19]**.

The secondary metabolites obtained from the Iris plants include flavonoids, isoflavonoids, phenolics, iridal type triterpenoids, irones, glycosides, quinines, stilbenes and xanthones. The *Iris* rhizomes exhibited typical isoflavonoids and iridals (mono and bicyclic triterpenoids), while the leaves showed phenolics, flavonoid aglycones, C-glycosylflavones, isoflavones, glycosides and xanthone. The protective role of isoflavones is eminent in menopausal symptoms, diseases like cardiovascular, osteoporosis and cancer **[20]**.

The other phytochemicals separated from the *Iris* species also manifest antioxidant, anti-inflammatory, anticancer, antimicrobial, antibacterial, antihelmintic, antiplasmodial, molluscicidal, pesticidal, antituberculosis, anticholinesterase, antiulcer, cytotoxic, free radical scavenging, hepatoprotective, hypolipidemic and immunomodulatory activities **[20]**.

Iridin, an iso-flavonoid (a type of flavonoid) was isolated from different species of Iris. Wani *et al*. (2017) procured *I. ensata* from two different locations, one from Narang, Kashmir and second from IIIM field Srinagar showed 2.751% and 1.984% dry weight of Iridin respectively. This shows the content of Iridin varies in different geographical locations **[6]**.

Unani doctrines suggest the active ingredient 'Iridin' to be bilious purgative (Mus'hil wa Mu'addil Safra), resolves ascitic condition, and at the same time attenuates jaundice. It stimulates metabolic rate, alleviates dyspepsia and acts as diuretic. The synergistic effect is seen when it is combined with any catalyst like mercuric chloride (*Raskapoor*). The therapeutic dose of Iridin ranges from 1-3 grain **[15]**.

4. DISCUSSION

Unani system of Medicine is a hub of the single (crude drugs that are used once) and compound (combination of two or more drugs) drugs. The origin of single drugs lies mainly in plant, animal and mineral; though herbal or plant origin drugs are used predominantly. These drugs are chosen according to diseased or health state of any individual, and also according to the temperament and chief action of the drug. *Irsa* (*I. ensata* Thunb.), a plant origin drug is a paradigm of such a drug that has diverse range of pharmacological actions and is efficacious in treating various illnesses. The detailed phytochemistry study revealed *Irsa* constitutes appreciable amount of secondary metabolites such as flavonoids, isoflavonoids, phenolics and glycoside etc that work in coherence with each other. One of the chief components of isoflavonoid,

identified as Iridin, covers the major portion of the plant's active constituents. The content of Iridin differs in plants collected from different areas. Research studies have shown consumption of diet rich in Iridin and other isoflavone reduces the risk of cancer, specifically prostate and breast cancer. Also, isoflavones play vital role against many dread full diseases as an antioxidant, anti-inflammatory, antimicrobial and estrogenic agent. Unani manuscripts highlight *Irsa* and its oil to be effective in many diseases. Inflammation of cells is addressed and regular functioning is restored owing to its *Muḥallil* (anti inflammatory/resolvent) property. Furthermore, *Irsa*'s *Mufattiḥ Sudad* (deobstruent) property aids in the removal of obstruction of liver, uterus, and other major organs caused by inflammation, enlarged lymph nodes, or trauma. It works as a concoctive of the four humours (viz. blood, bile, phlegm, black bile), specifically phlegm and bile. The resultant phlegm is then expectorated through cough and vomit, while bile is excreted through stool. The action is enhanced multiple folds when any catalyst is combined with it, most of the time aqueous solution of acetic acid, and/or alcohol.

The aforementioned chemical constituents and their evidence based scientific reports further testify the multipotent effect of *Irsa* (*I. ensata* root) and its oil.

5. CONCLUSION

On the basis of information extracted above, it is evident in the present review that *Irsa* is a drug that has been efficiently used in the Unani system of medicine for centuries to treat various diseases of respiratory system, liver and biliary system, uro-genital and reproductive system.

However, *Irsa* requires more testing in terms of toxicity studies, as it was identified as *Muzir (adverse)* for lungs in Unani doctrines. While Unani practitioners, on the other hand, used *Musleh* (corrective) like honey in their prescriptions to avoid such side effects. This adverse effect can be assessed by the thorough study and pre-clinical trial of *Irsa*, and its dose (*Miqdar Khurak*) can be graded, ranging from low to high.

Studies concerning standardization and quality control of herbal preparations are of utmost importance. The batch wise discrepancy in their efficacies, due to variation in soil and climatic conditions, seasonal changes, nutritional status and genetic alterations are few of the vital aspects that require proper intervention. Moreover, the need of clear demarcation of diseases is also their concerning herbal medicine, regarding their description of categories and

techniques, quite similar to that of conventional system, which presents specific insight of pathogenesis. Also, one of the alarming concerns is that due to shortage of scientific data, and insights of mechanism of action and involved neurochemical pathways, herbal medicine has not been accepted as the mainstream system of medicine. Thus, experimental and clinical studies are proposed to explore the mechanism of action, pharmacodynamics and pharmacokinetics, to ascertain its efficacy and safety in above stated diseases and illnesses.

ACKNOWLEDGEMENT

The authors are thankful to the library staff and all the members of Department of Ilmul Advia and Department of Ilmul Saidla, School of Unani Medical Education and Research, Jamia Hamdard for their prompt help, positive feedbacks and suggestions.

DECLARATION OF COMPETING INTEREST

The authors declare there is no conflict of interest in this review article.

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