Pharmacognostic And Phytochemical Perspectives On Manahshila (Realgar): Classification, Purification, And Standardization Approaches

Dr. Laxmi Narayan Gupta[1], Dr. Parameswarappa S. Byadgi[2], Prof. Neeraj Kumar[3], Jyoti Shah[4]

[1]Assistant Professor, Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
[2]Professor and Former Head, Department of Vikriti Vigyan, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
[3]Ex Prof. and Head, Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
[4]Ph.D. Scholar, Department: Department of Rasa Shastra and Bhaishajay Kalpana, Faculty of Ayurveda, IMS, BHU. Varanasi
Corresponding author- Dr. Parameswarappa S. Byadgi

Introduction:

Manahshila, commonly known as realgar (arsenic disulphide, As_2S_2), is a significant mineral drug in Ayurvedic medicine, particularly within Rasashastra. Classical sources describe it as a potent therapeutic agent with applications in dermatology, parasitic infestations, respiratory diseases, and some cognitive abnormalities. Because of its inherent toxicity as an arsenic compound, ancient Ayurvedic authorities highlight the importance of purification (Shodhana) before medical use. These traditional purification techniques comprise complex, multi-step processes that include medicinal decoctions, animal-derived media, and controlled heating, all of which are designed to purify the mineral and increase its therapeutic suitability.

According to modern science, Manahshila's therapeutic potential is strongly linked to its physicochemical qualities. Recent advances in analytical chemistry, mineral pharmacognosy, and pharmaceutical sciences have provided opportunities for a thorough examination of its structural transformations during Shodhana, such as changes in crystal morphology, reduction of toxic arsenic species, and incorporation of phytoconstituents from medicinal natural sources. X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), thermogravimetric analysis (TGA/DSC), and inductively coupled plasma mass spectrometry (ICP-MS) each assist in helping us understand the material at the molecular and elemental levels.

Despite its long history of usage, regulated procedures for ensuring Manahshila's quality, safety, and efficacy have yet to be developed. The integration of pharmacognostic identification, phytochemical evaluation, and toxicological assessment is essential for developing scientifically sound standards. This review seeks to integrate classical Ayurvedic knowledge with modern scientific insights into Manahshila, reviewing its classification, purifying procedures, and standardisation approaches from both traditional and contemporary perspectives. Manahshila is an Uparasa, according to Rasa Shastra. It is commonly used to treat urinary tract disorders, toxic conditions, and poisoning. The

chemical formula for Manahshila is arsenic disulphide (AS_2S_2). It has a bright orange-red appearance and a beautiful monoclinic crystalline structure.

Synonyms of Manahshila

Manahshila is also known by the names Rogashila, Shila, Naipalika, Manogupta, Manogya, Nagajihvaka, Kunati, Kulati, Gola, Nagamata, Kalyanika, and Rasanetrika. (R.T.11/104-05)

Mineralogical Identification of Realgar:

Physical and visual characteristics:

Colour: Bright red to orange-red.

Lustre: Submetallic to resinous, sometimes with a greasy appearance.

Streak: orange to red.

Hardness ranges from 1.5 to 2 on the Mohs scale.

Tenacity: Sectile, which implies it can be cut with a knife without breaking apart.

Cleavage on {010} is distinct and beautiful, but less so on other planes.

Other important defining characteristics:

Chemical composition: Arsenic Sulphide has the formula (As_4S_4).

Toxicity: Realgar is a hazardous arsenic-based mineral that should be handled with caution.

Light Sensitivity: It becomes unstable in light, eventually converting into the yellower mineral orpiment or its reddish-yellow powder form.

Association: It is generally encountered with the related mineral orpiment (As_2S_3) and occurs in veins with lead, silver, and gold ores or hot spring deposits.

Sources

Realgar is typically found in low-temperature hydrothermal pores, alongside arsenic and other antimony minerals. It is also found in magmas and hot springs. It has also been connected to Haratala, arsenolite, and calcite. It can be found in Hungary, the United States, China, and Spain. Manahshila (realgar, arsenic disulphide) is a naturally occurring mineral used in traditional Indian (Ayurvedic) medicine after a thorough purifying process. Manahshila grows naturally in India's Kumaun district (Uttarakhand) and Chitral (a area that was previously part of British India but is now in Pakistan).

Types:

It is categorised into three types:
1) Shyamangi
2) Kanaviraka.
3. Khandakhya (R.R.S. 3/88)

Shyamangi: Shyam, Rakta, and Gaura are heavier in weight.

Kanaviraka: Tamrabha, bright, and Nirgaura.

Khandakhya: Excessive redness, Churna Rupa, and heaviest. This is among the best of all types. (R.R.S. 3/89-90)

Grahya Lakshana

For Shodhana, utilise a stone-free Manahshila that is comparable in colour to Rakta Utpala but heavier and brighter. (R.T. 11/10)

Shodhana

1. Manahshila becomes Shuddha after administering Bhavana seven times using Agastya Patra Swarasa or Shringabera Swarasa. (R.R.S. 3/93)

2. It transforms into Shuddha after seven days of immersion in Churnodaka. (R.T. 11/109)

Satva Patana

Manahshila is well mixed with 1/8 of Mandura, Guda, Guggulu, and Ghrita before being placed in a Musha and heated to generate Manahshila Satva. Manahshila is blended with Bhunaga Satwa, Tankana, Madanaphala, and Karavellaka Swarasa bhavana given to generate a substance mixture. The mixture is then dried, stored in Musha, and heated to a higher temperature to produce Sattwa. (R.R.S. 3/95)

Discussion

The Ayurvedic literature divides Manahshila into numerous varieties based on physical characteristics like as colour, brightness, structure, and specific gravity.

Notable variants include:

Shyamangi: Shyam, Rakta, and Gaura have more weight.

Kanaviraka: Tamrabha, Bright, and Nirgaura.

Khandakhya: Excessive redness, Churna Rupa, and heaviest. This is one of the best of all types.

These classifications are consistent with the geological diversity of realgar deposits and the presence of trace minerals such orpiment (As_2S_3), sulphur, and iron oxides.

Pharmacognostic Evaluation (A Modern Perspective):

Modern pharmacognostic analysis analyses macroscopic aspects such colour, fracture pattern, transparency, and particle texture.

Microscopic aspects include crystalline shape and refractive qualities.

Physical factors include melting behaviour, density, hardness, and moisture content.

These standardised characteristics aid in distinguishing original Manahshila from adulterated and manufactured arsenic sulphide compounds.

Classic Shodhana Techniques:

Ayurvedic literature describes many Shodhana techniques, which are essentially categorised as:

a.It becomes Shuddha after seven days of immersion in Churnodaka.

b. Mardana (Trituration): This approach involves grinding plant juices including ginger, sesbania, and lemon to improve detoxification by reducing particle size and enhancing phytochemical interaction.

Physicochemical and Phytochemical Transformations:

Shodhana, a traditional Ayurvedic cleansing procedure, significantly alters the physicochemical and phytochemical composition of Manahshila (realgar, mostly arsenic disulphide, As4S4).These changes aim to decrease toxicity while boosting therapeutic efficacy and bioavailability.

Physicochemical Transformations:

The most significant physical and chemical changes that occur during the purification process (typically through levigation with acidic herbal juices like ginger juice) are:

Particle Size Reduction: By reducing particle size to the micro- or nano-range (54 µm to 15 µm), drug bioavailability and absorption are optimised.

Colour and Organoleptic Changes: The raw, vivid reddish-orange stone transforms into a dark brown, homogeneous powder that has entirely lost its original lustre.

Weight and moisture content increase: The Shodhana technique generates weight gain (an average of 8.83% in one study), indicating that the liquid media's components are absorbed and integrated. Moisture levels also rise in shodhita (purified) samples.

Elemental Composition Changes: Studies show an increase in the relative percentage of arsenic (As) and a decrease in sulphur (S) in the shodhita Manahshila, perhaps due to sulphur loss during trituration and the integration of elements from herbal liquids.

Crystallography and structure: X-ray Diffraction (XRD) tests reveal a shift in the crystal structure, yet the underlying molecule is often arsenic disulphide. The raw material (Ashodhita Manahshila) is frequently recognised as realgar or alacranite polymorphs.

pH Neutralisation: The alkaline nature of Manahshila is said to be neutralised by the acidic nature of the ginger juice employed in the procedure, resulting in a more neutral pH for the finished product.

Phytochemical Transformations:

Phytochemical transformations consist of the incorporation of active plant-derived components into the mineral matrix, which is an essential component of Ayurvedic medicine (Bhavana).

Incorporation of medicinal constituents: The approach improves the transfer of soluble inorganic components (such potassium, magnesium, and zinc) from herbal juices to the Manahshila.

Production of New Complexes: The grinding procedure is supposed to increase acid-base interactions and facilitate the formation of new, less toxic complexes or conjugates of mineral and organic molecules (phytochemicals) in medicinal juices.

Potential Methylation: Certain components in medicinal substances, such as cysteine, a methyl-donor peptide, are thought to aid in arsenic methylation, which can help in detoxification.

Final product standardisation (safety, effectiveness, and consistency):

The final product must be analysed to ensure its safety and compliance with established quality standards established by regulatory agencies such as the Ministry of Ayush, the Government of India, and the World Health Organisation (WHO).

Physicochemical profile:

Particle Size Analysis: Confirming the extremely tiny particle size, which is associated with enhanced bioavailability and efficacy.

Chemical fingerprinting is the process of confirming the botanical elements of a chemical formulation using techniques such as High-Performance Thin-Layer Chromatography (HPTLC) or High-Performance Liquid Chromatography (HPLC).

Safety and Quality Assurance:

Heavy Metal Analysis: Extensive testing of the final bhasma or formulation to verify heavy metal levels are less than the maximum permissible regulatory limits.

Stability and Shelf Life Testing: Stability and shelf life testing involves determining characteristics such as ash value, moisture content, and pH to assure product stability and shelf life.

Efficacy and toxicity studies: Conducting adequate pre-clinical or clinical trials to validate treatment claims and safety profiles.

This multi-layer architecture allows the final Manahshila-based product to achieve a high degree of quality, safety, and global acceptability.

Probable Physicochemical Changes

Shodhana of Khandakhya Makshika was processed (triturated) seven times with Ardraka Swarasa over a seven-day period. Shodhita Manahshila was evaluated using a variety of physicochemical parameters.

The results are as follows:

Sr. No.	Parameters	Value
1	Loss on drying at 110C (w/w)	0.5325%
2	Loss on ignition (w/w) at 4500-5500C	95.0686%
3	Ash value (w/w)	4.9544%
4	Water insoluble ash (w/w)	4.1978%
5	Acid insoluble ash (w/w)	0.5008%

Temperature is an important consideration during processing.
The melting point of Manahshila is 320^0C. Manahshila is mostly utilised as pure in a variety of Yogas. The Bhavana method purifies only at ambient temperature.

Medicated therapeutic Yogas:

1.Shila Sindoora
2.Sameerpannaga
3.Somanathi Tamra
4.Shwasakuthar Rasa
5.Manahshiladi Dhooma

Therapeutic efficacy of Manahshila(Charaka Samhita and Sushruta Samhita)

1. Manashila, gṛuhadhuma, ela, kasisa, lodhra, arjuna, musta, and sarja, when mixed with pita-gopitta (ox-bile) and ground, and then mixed again with sarshapa-taila (mustard oil) before administration by a wise physician in the form of a paste, cure kushtha diseases (which are difficult to treat otherwise), kilasa (leucoderma) in the early stages, sureshalupta (alopecia), and kitibha.C S Su 3/5-7
2. In order to cure kushtha, manahshila, ala, maricha (maricha seeds), taila (mustard oil), and arka-paya (arka latex) are mashed and combined into a paste (pradeha). C S Su 3/12
3. To treat Kushtha, mash Tuttha, Vidanga, Maricha, Lodhra, and Manahshila into a paste C S Su 4/12
4. To prepare the best lepa for kushtha, combine one karsha (10 g) of powdered manashila, bark of kuṭaja, kushtha, lomasha, aidagaja, karanja, bhurja granthi, and roots of karavira. Cook with 2.56 litres of tushodaka and palashanirdaharasa (palasha juice obtained by burning the roots) until semi-solid (darvipralepa). C S Su 3/15-16
5. Indralupta Chikitsa-After siravyadha, apply a paste containing Manahshila, Kasisa, Tuttha, Marica, or Kutannata, together with Devadaru. S S Chi 20/24-27
6. Treatment for Kaphaja Eye Disease- A paste made from priyangu, manahshila, and honey can be administered to the eye C S Chi 26/235.
7. Sauviranjana, tuttha, tapya-dhatu (maksika), manahshila, chaksushya (variety of kulattha), madhuka (Liquorice - Glycyrrhiza glabra), loha bhasma (iron), precious stones, pushpanjana, saindhava, tusk of boar, kataka - strychnos potatorum may be used in the form of either powder or varti as collyrium, which is excellent remedies for timira (cataract) and other eye-disease. C S Chi 26/250-251
8. Sukhavati varti includes kataka (Strychnos potatorum), shankha, saindhava (rock salt), shunthi, pippali (long pepper fruit), maricha (black pepper fruit), sugar, samudraphena, rasanjana (aqueous extract of Berberis aristata), honey, vidanga (Embelia ribes), manahshila, and hen's egg shell. Varti applying these ingredients rapidly relieves blurred vision, patala (covering), kacha (a type of cataract), and smelly discharge from the eyes. C S Chi 26/252-253
9. Pitaka churna is a powder produced from manahshila (realgar), yavakshara, haratala (orpiment), saindhava (rock salt), and daruharidra bark that is combined with honey and ghee-scum and applied to the mouth to treat oral disorders. It is known as pitaka-churna and is an effective treatment for oral disorders. C S Chi 26/196-198
10. Inhale powders of manahshila, vacha, trikatu, vidanga, hingu, and guggulu to get rid of kaphaja pinasa. C S Chi 26/152
11. Mritasanjivana (which contains manahshila) cures all types of poison, makes a person triumphant, revives a person who looks to be dead due to poisoning, and relieves fever. When inhaled, applied externally as an ointment, carried in the body as an amulet, smoked, or kept in the house, it cures evil spirits, poisons, germs, alaksmi (unluckiness), karmana (black magic), mantra (incantations recited to harm others), fire, thunderbolts, and enemies. It reduces the unpleasant effects of bad dreams and stri-dosha (poisons administered covertly by women). It guards against untimely death, fear of water, and robbery. It blesses people with prosperity, food grains, and success in their undertakings. It promotes prosperity, nutrition, and lifespan. This incredible recipe is called as mritasanjivana (recipe for restoring

the deceased). Lord Brahma recommended this recipe prior to the discovery of amrita (ambrosia). C S Chi 23/54-60

12. To achieve success in all therapies, the mahagandhahasti recipe (which includes manahshila) can be consumed internally as a drink (by diluting with liquids), applied as collyrium in the eyes, or applied externally as a paste.

    When used consistently (frequently) in conjunction with a healthy diet rich in beneficial nutrients, it treats eye disorders such as pilla, kandu, timira, ratri andha, kacha, arbuda, and patala. It is effective in treating vishama jwara, indigestion, dadru, kandu, choleric diarrhoea, and pama. It instantly treats diseases caused by toxins from rats, spiders, all varieties of snakes, and all forms of roots and rhizomes. C S Chi 23/78-94

Research updates

Sharma Vinamra et al. conducted a study on the Shodhana of two Manhshila samples designated as Kanavirak and Khandhakya by Bhavana, using fresh ginger juice. The process was repeated seven times. After that, all four were examined using contemporary tools. Kanavirak is classified as alacranite and Khandakhya as realger based on an XRD analysis. While EDXA verifies arsenic levels of 51.33% in alacranite and 68.14% in realger samples, respectively. SEM analysis of M3 (Shuddha Manahshila-Khandhakya variety) reveals that the minimum size of half of the particles ranges from 400 to 800 nm (highest size 15:55 nm).

Conclusion

Manahshila (also known as Manashila or Manahshila) is the conventional Ayurvedic term for the mineral realgar. Its chemical name is arsenic disulphide (As_2S_2 or As_4S_4) . It is an important component of traditional Indian medicine and alchemy (Rashastra).

Manahshila is found in red and yellow tones, typically as red-orange crystals or powders. Ayurvedic scriptures describe three principal varieties: Shyamangi, Kanaviraka, and Khandakhya, with Khandakhya being the most beneficial for medical purposes. Manahshila has been used for ages in Ayurvedic medicine to treat a variety of ailments. It has been proposed that it helps balance the Vata and Kapha doshas. Traditional use includes treating skin illnesses, respiratory ailments such as cough and asthma, eye diseases, psychological issues, discomfort, and inflammation.

Manahshila contains arsenic, making it a potentially fatal substance in its raw form. As a result, it must undergo a stringent purification procedure called as Shodhana before being used for therapeutic purposes.

The Shodhana method typically consists of a series of treatments (triturations) with specific medicinal liquids, most notably ginger (Zingiber officinale) juice. This purification is predicted to minimise toxicity while enhancing efficacy by drastically lowering particle size and modifying physicochemical properties.

Modern research has revealed that Manahshila and its formulations, when properly purified and consumed in appropriate proportions, can be safe and beneficial in treating a number of diseases.

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