

Pharmaceutico-Analytical Assessment of *Amrutadi Ashmarihar Yog*: An Ayurvedic Herbo-Mineral Formulation

Preeti¹, Peeyusha Pandey¹, Govind Sahay Shukla², Rajaram Agarwal³,
Manisha Goyal⁴, Ravi Pratap Singh⁵

¹MD Scholar, ²Vice Chancellor, ³HOD & Professor, ⁴Associate Professor,
⁵Assistant Professor,

PG Dept. of Ras Shastra & Bhaishajya Kalpana,
Post Graduate Institute of Ayurveda,
Dr. Sarvepalli Radhakrishnan Rajasthan Ayurveda University, Jodhpur, Rajasthan.

Corresponding Author: Dr. Preeti, Dr. Peeyusha Pandey

DOI: <https://doi.org/10.52403/ijhsr.20260935>

Received: 11/05/2026; Revised: 04/08/2026; Accepted: 23/09/2026

ABSTRACT

Introduction: *Amrutadi Ashmarihar Yog* is classical herbo-mineral formulation indicated for the management of *Mutrashmari* (Urolithiasis). Despite its therapeutic significance, comprehensive pharmaceutico-analytical evaluation of the formulation has not been adequately documented. Scientific validation through pharmaceutical preparation and analytical assessment is essential to establish its quality, identity, purity, and safety.

Materials and Methods: The formulation was prepared using authenticated raw materials following the classical pharmaceutical procedures described in *Rasa Tarangini*. The pharmaceutical study included purification of *Shilajatu* and *Vatsanabha*, preparation of *Pashanabheda Ghana*, *Yavakshara*, and formulation of *Amrutadi Ashmarihar Yog*. The prepared formulation was subjected to organoleptic, physicochemical, chromatographic, spectroscopic, and safety evaluation. Analytical parameters included pH, loss on drying, total ash, acid-insoluble ash, water- and alcohol-soluble extractive values, particle size analysis, High-Performance Thin-Layer Chromatography (HPTLC), Fourier Transform Infrared Spectroscopy (FTIR), and heavy metal analysis using ICP-MS.

Results: The prepared formulation was obtained as a fine, homogeneous, dark brown to blackish-brown powder with a characteristic odour and bitter, slightly saline, and astringent taste. The physicochemical parameters were found to be: pH 5.69, loss on drying 8.64%, total ash 44.75%, acid-insoluble ash 1.50%, water-soluble extractive 39.95%, alcohol-soluble extractive 11.98%, and particle size passing through 40-mesh sieve 97.51%. HPTLC generated a characteristic chromatographic fingerprint with distinct bands, while FTIR confirmed the presence of characteristic functional groups corresponding to phytochemical and mineral constituents. Heavy metal analysis showed compliance of cadmium and lead with the applicable limits, whereas arsenic and mercury were observed slightly above their respective cited reference limits.

Conclusion: The formulation exhibited characteristic physicochemical, chromatographic and spectroscopic profiles. ICP-MS analysis showed that cadmium and lead were within their cited permissible limits, whereas arsenic and mercury were above their respective cited limits.

Keywords: Amrutadi Ashmarihar Yog; Mutrashmari; Urolithiasis; *Vatsanabha*, *Shilajatu*; *Yavakshara*; *Pashanbheda*; HPTLC, FTIR

INTRODUCTION

Ayurveda, the ancient science of life, aims not only at the treatment of diseases but also at the preservation and promotion of health. According to Ayurveda, maintenance of equilibrium among *Dosha*, *Dhatu*, *Mala*, and proper functioning of *Agni* are essential for attaining and preserving health [1]. The fundamental objective of Ayurveda is stated as “*Swasthasya Swasthya Rakshanam Aturasya Vikara Prashamanam Cha* [2]”, which signifies the protection of health in healthy individuals and alleviation of diseases in the diseased.

Rasa Shastra employs a wide range of herbo-mineral formulations (*Rasaushadhis*) to manage chronic and complex disorders. These formulations are prepared through systematic pharmaceutical processes such as *Shodhana*, *Bhavana*, and *Mardana*, which are intended to detoxify raw materials, enhance therapeutic efficacy, and improve the stability of the final product. Because the quality of the finished formulation largely depends on these pharmaceutical procedures, scientific documentation and analytical evaluation are essential to ensure the identity, purity, safety, and reproducibility of Ayurvedic medicines. [3]

Mutrashmari, one of the *Ashtamahagada* described in Ayurveda, closely resembles urolithiasis in modern medicine. It is characterized by the formation of urinary calculi, resulting in severe pain, urinary obstruction, dysuria, and a high tendency for recurrence. Globally, urolithiasis remains a significant healthcare problem, with increasing prevalence attributed to dietary habits, lifestyle changes, inadequate fluid intake, and metabolic abnormalities. Despite advances in minimally invasive surgical procedures, recurrence remains common, highlighting the importance of effective

preventive and conservative therapeutic approaches. [4-6]

Amrutadi Ashmarihar Yog is a classical herbo-mineral formulation described in *Rasa Tarangini* under the *Amayika Prayoga* of *Vatsanabha* for the management of *Mutrashmari*. The formulation comprises *Shuddha Vatsanabha*, *Shuddha Shilajatu*, *Pashanabheda*, and *Yavakshara*, ingredients traditionally known for their *Ashmaribhedana*, *Mutrala*, and *Shoolahara* properties. The therapeutic potential of these individual ingredients has been reported in both classical Ayurvedic literature and contemporary scientific studies. However, the pharmaceutical processing and comprehensive analytical evaluation of the finished formulation require systematic documentation to establish reproducible quality parameters. [7-10]

With the growing global acceptance of Ayurvedic medicines, integration of classical pharmaceutical principles with modern analytical techniques has become increasingly important for quality assurance. Physicochemical evaluation, chromatographic fingerprinting, spectroscopic characterization, and heavy metal analysis provide objective evidence regarding the quality, purity, consistency, and safety of herbal and herbo-mineral formulations. Such investigations also facilitate batch-to-batch uniformity and contribute to the scientific validation of traditional formulations. [11-14]

Therefore, the present study was undertaken to prepare *Amrutadi Ashmarihar Yog* according to the classical method described in *Rasa Tarangini* and to carry out its comprehensive pharmaceutico-analytical evaluation using pharmaceutical observations, physicochemical parameters, HPTLC fingerprinting, FTIR spectroscopy, and ICP-MS analysis. The findings of the

study may serve as baseline quality control data and provide a scientific reference for future pharmaceutical, pharmacological, and clinical investigations of this classical formulation.

Aims And Objectives:

- To prepare and carry out the pharmaceutico-analytical assessment of *Amrutadi Ashmarihar Yog* according to classical Ayurvedic procedures.
- To evaluate the pharmaceutical characteristics and analytical parameters of the prepared formulation using standard analytical techniques.

MATERIALS & METHODS

Materials

- The raw materials required for the preparation of *Amrutadi Ashmarihar Yog*, namely *Vatsanabha*, *Shilajatu*, *Pashanabheda*, and *Yava*, were procured from authenticated sources. All the raw drugs were identified and authenticated in the Department of *Dravyaguna and Rasa shastra and Bhaishajya Kalpana*, Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University, Jodhpur. The formulation was prepared in the Departmental Laboratory of RS&BK, PGIA, Jodhpur.

Method of Preparation:

Ingredients:

Table No.1: Ingredients of *Amrutadi Ashmarihar Yog*

S. No.	Contents	Latin Name	Family	Quantity
1.	<i>Shuddha Vatsanabha</i>	<i>Aconitum ferox</i> Wall. ex Ser.	Ranunculaceae	1 part
2.	<i>Shuddha Shilajatu</i>	<i>Asphaltum Punjabianum</i>	-	8 parts
3.	<i>Pashanbheda churna</i>	<i>Bergenia ligulata</i> Wall.	Saxifragaceae	96 parts
4.	<i>Yavakshara</i>	<i>Hordeum vulgare</i> L.	Poaceae	13 parts

Images Showing the ingredients of *Amrutadi Ashmarihar Yog*



Figure 1: (a) Ingredients of Raw drug of *Amrutadi Ashmarihara Yog*
 (b) *Churnikarana* of all drugs
 (c) Mixing all the Ingredients
 (d) Mixed Powder of All Ingredients
 (e) Capsules of *Amrutadi Ashmarihara Yog*

Preparation of Amrutadi Ashmarihar Yog involves the following procedure –

1. *Shilajatu Shodhana*
2. *Vatsanabha Shodhana*
3. Preparation of *Pashanabheda Kwatha*
4. Preparation of *Pashanabheda Ghana*
5. Preparation of *Yavakshara*
6. Pulverization and sieving of ingredients
7. Preparation of *Amrutadi Ashmarihar Yog*
8. Capsule filling

1. *Shilajatu Shodhana* [15]

The *Agnitapi* method was adopted using *Triphala Kwatha* as purification medium.

Materials

- Impure *Shilajatu* stone – 2 kg
- *Triphala Yavakuta Churna* – 2 kg
- Water – 16 L (for preparation of *Triphala Kwatha*)

Procedure

Triphala Kwatha was prepared by boiling *Triphala Yavakuta Churna* with eight times water and reducing it to one-fourth of the initial volume. The powdered impure *Shilajatu* was dissolved in lukewarm *Triphala Kwatha* and filtered through a double-folded cotton cloth to remove coarse impurities. The filtrate was kept undisturbed overnight to allow sedimentation of insoluble impurities. The clear supernatant was carefully decanted and concentrated over mild heat with continuous stirring until a semisolid consistency was obtained. The semisolid mass was dried to obtain purified *Shilajatu*. Residual *Shilajatu* present in the sediment was recovered by the *Santanika* method and added to the purified product.

Result

From 2000 g of impure *Shilajatu*, 950 g of purified semisolid and 658 g of purified dry *Shilajatu* were obtained, corresponding to yields of 47.5% and 32.9%, respectively. The reduction in yield was mainly attributed to the removal of extraneous impurities and moisture during the purification process.

2. *Vatsanabha Shodhana* [16]

The purification was carried out by the *Nimajjana* method using *Gomutra* as the purification medium.

Materials

- Ashuddha *Vatsanabha* – 150 g
- *Gomutra* – 1350 mL

Procedure

Ashuddha *Vatsanabha* was washed with lukewarm water, dried, and crushed into *Chanaka Pramana* pieces using an *Udukhal Yantra*. The pieces were immersed in *Gomutra* in an earthen vessel and exposed to sunlight. Fresh *Gomutra* was added daily for three consecutive days after removing the previously used medium, following the classical method. After completion of the purification process, the drug was thoroughly washed with lukewarm water, dried under sunlight, pulverized, and sieved through sieve No. 80 to obtain purified *Vatsanabha* powder.

Result

A total of 1100 mL of *Gomutra* was absorbed during the process. From 150 g of Ashuddha *Vatsanabha*, 79.8 g of purified *Vatsanabha* was obtained, corresponding to a 53.2% yield. The reduction in weight was mainly attributed to the removal of toxic and extraneous constituents during *Shodhana*, washing, pulverization, and handling losses.

3. Preparation of *Pashanabheda Kwatha* [17]

- *Pashanabheda* – 4 kg
- Potable water – 32 L (8 times the weight of the drug)

Procedure

The cleaned and dried *Pashanabheda* was coarsely powdered and soaked overnight in eight times its quantity of potable water. On the following day, the mixture was boiled over mild heat with intermittent stirring until the volume was reduced to one-fourth of its original quantity. The prepared *Kwatha* was filtered through a clean cotton cloth, and the filtrate was collected for the preparation of *Pashanabheda Ghana*.

Result

During boiling, the colour of the decoction gradually changed from light brown to dark

brown, while evaporation increased progressively with continuous heating. The maximum temperature recorded during boiling ranged between 90°C and 105°C. The preparation required 5 hours 40 minutes, yielding 8.2 L of *Pashanabheda Kwatha* and 2.4 kg of residual marc, corresponding to a 25.63% yield of decoction from the initial volume of water.

4. Preparation of *Pashanabheda Ghana* [18]

Procedure

The prepared *Pashanabheda Kwatha* was heated over mild heat with continuous stirring until it attained a semisolid consistency. Then the semisolid mass was transferred to stainless steel trays and dried in sunlight.

Result

Drying at 45–50°C produced a hard, brittle mass, which was easily pulverized into a fine powder. The entire process required approximately 6 hours, yielding 752.5 g of

Pashanabheda Ghana, corresponding to a 18.81 % yield with respect to the initial volume of raw *Pashanabheda*.

5. Preparation of *Yavakshara* [19]

Procedure

Mature *Yava Panchanga* was cleaned, dried, and incinerated completely to obtain whitish-grey ash. The ash was mixed with eight times its quantity of water, stirred thoroughly, and kept undisturbed overnight. The clear supernatant (*Ksharajala*) was separated by siphoning, filtered through cotton cloth, and heated over *Madhyama Agni*, followed by *Mandagni*, with continuous stirring until complete evaporation of the aqueous portion. The resulting whitish *Yavakshara* was cooled, collected, and stored in airtight containers for further use.

Observations

From 32 kg of dried *Yava Panchanga*, 2.966 kg of ash was obtained (9.26%), which yielded 18.252 L of *Ksharajala* (76.92%).

Table No. 3: Batch-wise Yield of *Ksharajala*

S. No.	Parameters	Batch I	Batch II	Batch III	Total
1	Weight of ash taken (g)	1000	980	986	2966
2	Volume of water added (mL)	8000	7840	7888	23,728
3	Volume of <i>Ksharajala</i> obtained (mL)	6150	6020	6082	18,252
4	Yield of <i>Ksharajala</i> (%)	76.88	76.79	77.11	76.92

The percentage yield of *Yavakshara* was calculated based on the weight of *Kshara* obtained after evaporation of *Ksharajala*. Three batches were prepared, yielding 189.1 g, 183 g, and 178 g of *Kshara*, respectively.

The average yield of *Kshara* obtained from *Ksharajala* was 3.01%, whereas the average yield calculated with respect to ash was 24.72%.

Table No. 4: Observations Recorded During Evaporation of *Ksharajala* for *Yavakshara* Preparation

S. No.	Parameters	Batch I	Batch II	Batch III	Average
1	<i>Ksharajala</i> taken for evaporation	6150 mL	6020 mL	6082 mL	6084 mL
2	Time required for evaporation of <i>Ksharajala</i>	2 h 30 min	2 h 55 min	3 h 00 min	2 h 48 min
3	<i>Kshara</i> obtained	189.1g	183 g	178 g	183.37 g
4	% of <i>Kshara</i> obtained (from <i>Ksharajala</i>)	3.07%	3.04%	2.93%	3.01%
5	% of <i>Kshara</i> obtained (from Ash)	25.21%	25.07%	23.89%	24.72%

All the purified and prepared ingredients were accurately weighed according to the classical proportion. *Shuddha Vatsanabha*, *Shuddha Shilajatu*, *Pashanabheda Ghana*, and *Yavakshara* were individually pulverized, passed through sieve No. 80, and

mixed uniformly in a double-cone blender to obtain a homogeneous powder. The prepared formulation was stored in an airtight container until further use for capsule filling and analytical evaluation.

6. Capsule Filling ^[20]

Procedure

The prepared powder blend was filled into hard gelatin capsule shells using a manual capsule filling machine. The filled capsules were checked for uniformity, cleaned to remove adhering powder, packed in airtight containers, and stored for analytical evaluation and clinical use.

Result

A total of 1381 g of *Amrutadi Ashmarihar Yog* powder blend was subjected to capsule filling using 500 mg and 250 mg hard gelatin capsule shells. The process yielded 1800 capsules of each strength, resulting in a total of 3600 capsules. Of the total powder blend, 1350 g was successfully encapsulated (900 g in 500 mg capsules and 450 g in 250 mg capsules), while 31 g of material was lost during processing, corresponding to a 2.24% processing loss. The low percentage of material loss indicates satisfactory process efficiency and good suitability of the powder blend for capsule filling.

ANALYTICAL STUDY

Analytical evaluation is an essential component of the standardization and quality

assessment of pharmaceutical formulations. It provides scientific evidence regarding the identity, purity, quality, safety, and consistency of a drug. All the analytical parameters were performed according to the API (Ayurvedic Pharmacopeia of India), at the Drug Testing Laboratory, Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University (DSRRAU), Jodhpur, Rajasthan, and Cultivator Phyto Lab Private Limited, Jodhpur, Rajasthan, India.

Organoleptic evaluation: Colour, odour, taste, and texture were recorded.

- Colour-Dark brown to blackish-brown
- Odour-Slight *Gomutra Gandhi*
- Taste-Bitter, slightly saline and astringent
- Appearance-Fine, free-flowing, homogeneous powder

Physico- chemical Parameters: pH value, Moisture content, Ash value (total ash value, acid-insoluble ash), Extractive values (water soluble and alcohol soluble).

Table no.5: Results of Physico-chemical tests

S. No.	Parameter	Observed Value
1.	pH ^[21]	5.69
2.	Loss on Drying at 105°C ^[22]	8.64 %
3.	Total Ash Value ^[23]	44.75 %
4.	Acid insoluble ash ^[24]	1.507%
5.	Water Soluble Extractive ^[25]	39.95 %
6.	Alcohol Soluble Extractive ^[26]	11.98 %
7.	Particle Size (40 Mesh), % passes through	97.51%

High Performance Thin Layer

Chromatography ^[27]

HPTLC Fingerprinting method

HPTLC fingerprinting of *Amrutadi Ashmarihar Yog* was performed using a CAMAG HPTLC system equipped with visionCATS software (Version 4.0.24047.1). A precoated Merck TLC Silica gel 60 F254 plates (100 × 100 mm) were used as the stationary phase. The sample solution was prepared by dissolving 30 mg of formulation powder in 3 mL of water, giving a

concentration of 10 mg/mL. The sample solution was applied as bands using a Linomat 5 applicator at volumes of 2, 4, 6, and 8 µL.

Chromatographic development was carried out in a twin-trough chamber (TTC) 10 × 10 chamber using formic acid, methanol, ethyl acetate, and toluene in the ratio of 0.2:1:3:7 (v/v/v/v) as the mobile phase. The chamber was saturated for 20 min, and the solvent front was allowed to migrate up to 70 mm. The developed plate was dried for 5 min at

room temperature. Densitometric scanning was performed using a TLC Scanner 4 at 254 nm in absorbance mode. Spectral scanning was performed over the range of 190–450 nm.

The HPTLC fingerprint profile was recorded at 254 and 366 nm. The observed bands were documented at their respective R_f values.

Results

Under UV 254 nm, characteristic bands were observed at R_f values of 0.16, 0.34, and 0.44,

while under UV 366 nm, a prominent fluorescent band was observed at R_f 0.32. A band at approximately R_f 0.32 was observed in the sample. Based on comparison with previously reported literature R_f values for gallic acid, this band was tentatively assigned to gallic acid. However, since an authentic gallic acid reference standard was not analyzed under identical chromatographic conditions, the identification remains tentative and requires further confirmation.

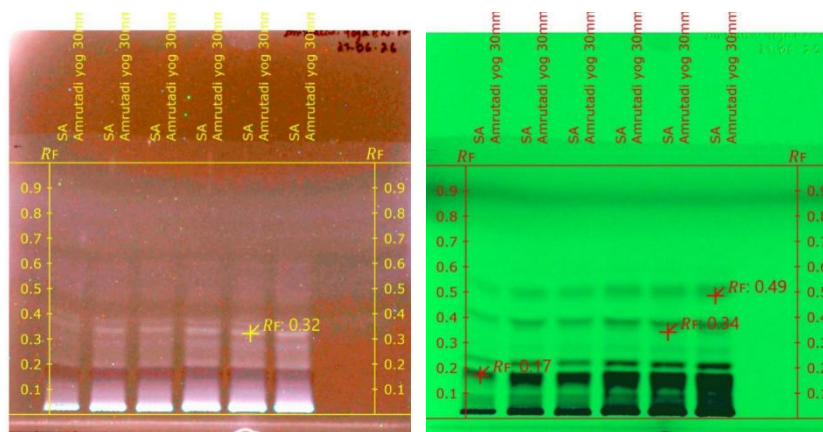


Fig.2: HPTLC Fingerprints (a) AT 254nm;(b) AT 366nm

Fourier Transform Infrared Spectroscopy (FTIR) [28]

Fourier Transform Infrared (FTIR) spectroscopy was employed to characterize the infrared absorption profile of the formulation and to obtain preliminary

information regarding the functional groups present in it. The FTIR spectrum exhibited characteristic absorption bands over the range of 618.7–3369.5 cm^{-1} . The major absorption bands and their tentative assignments are presented in Table 6.

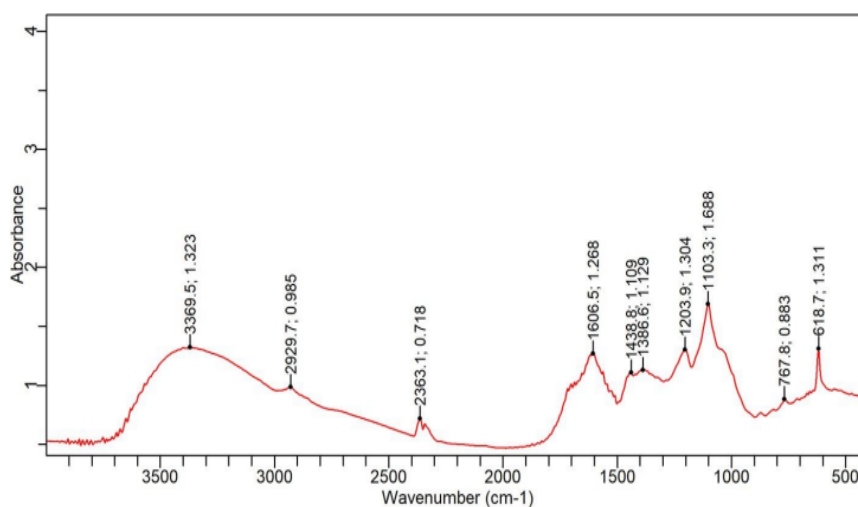


Fig.3: FTIR Spectrum of Amrutadi Ashmarihar Yog

Table no. 6: FTIR Spectral Peaks with Tentative Functional-Group Assignments and Possible Interpretations

Wavenumber (cm ⁻¹)	Tentative functional-group assignment	Possible interpretation
3369.5	O–H stretching	Hydroxyl-containing constituents such as phenolic and alcoholic groups
2929.7	C–H stretching	Aliphatic C–H vibrations
2363.1	Atmospheric CO ₂ /carbonate region	Possible atmospheric CO ₂ contribution; not considered a specific phytochemical marker
1606.5	C=C aromatic stretching / COO ⁻ asymmetric stretching	Aromatic or carboxylate-associated vibrations
1438.8	CH ₂ bending / COO ⁻ vibration	Skeletal or carboxylate-associated vibration
1386.6	C–H bending / O–H bending	Bending vibrations of organic constituents
1203.9	C–O stretching	Alcohols, phenolic compounds or ethers
1103.3	C–O–C / C–O stretching	Ether, glycosidic or other oxygen-containing groups
767.8	Aromatic C–H bending	Aromatic ring-associated vibration
618.7	Low-wavenumber/fingerprint-region vibration	May include vibrations associated with inorganic/mineral components

HEAVY METALS DETECTION ^[29]

Heavy metal analysis of the formulation was carried out using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The concentrations of arsenic (As), cadmium (Cd), lead (Pb), and mercury (Hg) were found to be 3.033, 0.038, 0.330, and 1.08 mg/kg, respectively. On comparison with the

applicable permissible limits, cadmium and lead were found to be within the prescribed limits, whereas arsenic (3.033 mg/kg) marginally exceeded the cited permissible limit of 3.0 mg/kg and mercury (1.08 mg/kg) exceeded the cited permissible limit of 1.0 mg/kg.

Table no.7: Heavy Metal Analysis of Amrutadi Ashmarihar Yog

Heavy metal	Observed value (mg/kg)	Permissible limit (mg/kg)	Interpretation
Arsenic (As)	3.033	3.0	Slightly above limit
Cadmium (Cd)	0.038	0.3	Within limit
Lead (Pb)	0.330	10.0	Within limit
Mercury (Hg)	1.08	1.0	Above limit

RESULT

Amrutadi Ashmarihar Yog was successfully prepared by following the classical pharmaceutical procedures described in *Rasa Tarangini*. *Shilajatu Shodhana* yielded 658 g (32.9%) of purified dry *Shilajatu* from 2 kg of raw material, while *Vatsanabha Shodhana* yielded 79.8 g (53.2%) of purified *Vatsanabha* from 150 g. Preparation of *Pashanabheda Kwatha* yielded 8.2 L, followed by 752.5 g of *Pashanabheda Ghana*. From 32 kg of *Yava Panchanga*, 2.966 kg of ash was obtained for a total of 550.11 g *Yavakshara* preparation. The final formulation yielded a homogeneous fine powder, which was filled into 3600 capsules of 500 mg and 250 mg strengths, with a processing loss of 2.24%.

The formulation was dark brown to blackish-brown in colour, with a slightly *Gomutra*-like odour and bitter, slightly saline and astringent taste. Physicochemical analysis showed pH 5.69, loss on drying 8.64%, total ash 44.75%, acid-insoluble ash 1.507%, water-soluble extractive 39.95%, acid-soluble extractive 11.98%, and 97.51% particles passing through 40-mesh sieve. HPTLC analysis revealed characteristic bands at R_f 0.16, 0.34 and 0.44 at 254 nm, while a prominent band at R_f 0.32 was observed at 366 nm and was suggestive of gallic acid. FTIR analysis demonstrated characteristic absorption peaks corresponding to hydroxyl, aliphatic C–H, aromatic C=C, C–O, C–O–C and metal–oxygen functional groups.

ICP-MS analysis showed arsenic, cadmium, lead and mercury concentrations of 3.033, 0.038, 0.330 and 1.08 mg/kg, respectively. These findings establish the preliminary pharmaceutical and analytical profile of *Amrutadi Ashmarihar Yog* and provide baseline parameters for its quality assessment and standardization.

DISCUSSION

Discussion on Pharmaceutical Study

The pharmaceutical preparation of *Amrutadi Ashmarihar Yog* involved systematic *Shodhana* of *Vatsanabha* and *Shilajatu*, followed by preparation of *Pashanabheda Ghana* and *Yavakshara*, and subsequent *Churna Nirmana*, sieving and uniform blending. These sequential processes helped in obtaining purified, pharmaceutically suitable ingredients and a homogeneous final formulation, thereby ensuring consistency and facilitating its further encapsulation.

Shodhana of *Shilajatu* and *Vatsanabha* is an important pharmaceutical step to improve the purity and safety of these raw materials before their incorporation into the formulation. Crude *Shilajatu* may contain external impurities such as soil, sand, rock particles and other extraneous matter, along with potentially undesirable inherent inorganic constituents depending on its source, may contain undesirable organic and inorganic contaminants, including degraded organic matter formed due to prolonged environmental exposure and improper storage, which may affect its quality and safety; therefore, dissolution, filtration and sedimentation during *Shodhana* help separate these unwanted materials and obtain a pharmaceutically suitable fraction. [30]

In contrast, *Vatsanabha* naturally contains highly toxic diester-diterpenoid alkaloids, particularly aconitine, mesaconitine and hyaconitine. Scientific evidence suggests that appropriate processing of *Aconitum* can reduce toxicity through hydrolysis/de-esterification of these alkaloids, converting highly toxic diester alkaloids into comparatively less-toxic monoester derivatives such as benzoylaconine and,

subsequently, amino alcohol alkaloids such as aconine, along with possible removal of some alkaloidal constituents. Thus, *Shodhana* of both drugs has a rational pharmaceutical basis for reducing undesirable constituents and improving the suitability of the processed materials for therapeutic use. [31]

During *Kwatha* preparation, water-soluble phytoconstituents and bioactive compounds such as bergenin, gallic acid, arbutin and catechin can be extracted into the aqueous medium. Subsequent concentration and drying help retain these extractable constituents in a concentrated pharmaceutical form, thereby facilitating their uniform incorporation into *Amrutadi Ashmarihar Yog*. The API-specified water-soluble extractive value of not less than 15% further supports the importance of the aqueous-soluble fraction of *Pashanabheda* in its quality assessment. [32]

The classical preparation of *Yavakshara* is designed to selectively obtain and concentrate the water-soluble alkaline fraction of *Yava Panchanga*. Incineration first converts the organic plant material into ash, leaving behind its inorganic constituents. Treatment of the ash with water then dissolves the water-soluble alkaline salts, while filtration separates the insoluble residue. Subsequent evaporation concentrates these soluble constituents into *Yavakshara*. [33]

Thus, this sequential process helps separate the desired alkaline fraction from insoluble material and converts it into a concentrated, uniform and pharmaceutically convenient form.

Discussion on Analytical Study

The dark brown to blackish-brown colour and characteristic odour may be attributed to the combined contribution of *Shuddha Shilajatu*, *Pashanabheda Ghana* and *Shuddha Vatsanabha*. The bitter, slightly saline and astringent taste reflects the combined characteristics of the ingredients. The fine, free-flowing and homogeneous powder indicates adequate drying, pulverization and

blending, which are important for uniform capsule filling and dose consistency.

The pH of 5.69 indicates a slightly acidic nature of the formulation, reflecting the combined contribution of its herbal and mineral constituents. The loss on drying of 8.64% indicates controlled residual moisture, which is important for the stability and storage quality of the formulation.

The relatively high total ash value reflects the inorganic fraction contributed by *Yavakshara* and *Shuddha Shilajatu*, while the comparatively low acid-insoluble ash indicates limited acid-insoluble extraneous matter. The higher water-soluble extractive value compared with alcohol-soluble extractive indicates a predominance of aqueous-extractable constituents. The 97.51% passage through 40-mesh sieve indicates adequate fineness and supports homogeneous mixing and uniformity during encapsulation.

HPTLC produced a characteristic chromatographic fingerprint with distinct bands at 254 and 366 nm, demonstrating the presence of multiple phytoconstituents and providing a reproducible profile for identification and future batch comparison. The band at R_f 0.32 was comparable with the gallic acid reference standard, suggesting its probable presence in the formulation. However, quantitative or confirmatory analysis by HPLC/LC-MS would be required for definitive identification.

FTIR demonstrated characteristic functional groups corresponding to hydroxyl, aliphatic C–H, aromatic, carboxylate, C–O/C–O–C and fingerprint-region vibrations. The overall spectral profile reflects the presence of diverse organic and inorganic constituents in the tested herbo-mineral formulation. However, the functional-group assignments are tentative and should not be interpreted as definitive identification of individual phytoconstituents or chemical compounds in the absence of appropriate authenticated reference standards.^[34]

ICP-MS was performed to assess elemental safety of the formulation. Lead and cadmium were within the prescribed limits, whereas

arsenic and mercury were reported above the applicable permissible limits in the present study. As ICP-MS measures total elemental concentration, the exact source of these elements cannot be established without individual raw-drug analysis. Therefore, these findings highlight the importance of stringent raw-material authentication, appropriate *Shodhana* and routine elemental monitoring of the finished formulation.^[35]

CONCLUSION

The present study successfully established the pharmaceutico-analytical profile of *Amrutadi Ashmarihar Yog* prepared through classical Ayurvedic pharmaceutical procedures. Systematic *Shodhana*, *Pashanabheda Ghana* and *Yavakshara* preparation, followed by proper pulverization and blending, resulted in a homogeneous formulation suitable for encapsulation. The physicochemical parameters, HPTLC fingerprint and FTIR profile provided characteristic baseline data for identification and quality assessment.

Declaration

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

Creative Commons Attribution License 4.0

This is an open-access article published under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0).

<https://creativecommons.org/licenses/by/4.0>

REFERENCES

1. Shastri AD, editor. *Sushruta Samhita with Ayurveda Tattva Sandipika Hindi commentary*. Varanasi: Chaukhambha Sanskrit Sansthan; 2017. Sutrasthana 15/48.
2. Agnivesha. *Charaka Samhita with Vidyotini Hindi commentary*. Shastri K, Chaturvedi GN, editors. Part 1. Varanasi: Chaukhambha Bharati Academy; 2012. Sutrasthana 30/26.
3. Shastri AD, commentator. *Sushruta Samhita with Ayurveda Tattva Sandipika Hindi commentary*. Varanasi: Chaukhambha Sanskrit Sansthan. Sutrasthana 33/4.

4. Singh S, Gupta S, Mishra T, Banerjee BD, Sharma T. Risk factors of incident kidney stones in Indian adults: a hospital-based cross-sectional study. *Cureus*. 2023;15(2): e35558. doi:10.7759/cureus.35558.
5. Qian X, Wan J, Xu J, Liu C, Zhong M, Zhang J, et al. Epidemiological trends of urolithiasis at the global, regional, and national levels: a population-based study. *Biomed Res Int*. 2022; 2022:6807203. doi:10.1155/2022/6807203.
6. Liu Y, Chen Y, Liao B, Luo D, Wang K, Li H, et al. Epidemiology of urolithiasis in Asia. *Asian J Urol*. 2018;5(4):205-214. doi: 10.1016/j.ajur.2018.08.007.
7. Shastri AD, editor. *Sushruta Samhita with Ayurveda Tattva Sandipika Hindi commentary*. Varanasi: Chaukhambha Sanskrit Sansthan; 2017. Chikitsasthana 7/30.
8. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 24th Taranga, verse 137.
9. Mishra B, Vaisya R, editors. *Bhavaprakasha Nighantu of Bhavamishra with Vidyotini Hindi commentary*. Varanasi: Chaukhambha Sanskrit Bhawan. Mishraprakaran 8/170.
10. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 22nd Taranga, verse 84.
11. Sharma PV. *Dravyaguna Vijnana*. Vol. 2. Varanasi: Chaukhambha Bharati Academy; 2013. p. 650-652.
12. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 13th Taranga, verses 6-8.
13. Vagbhatacharya. *Rasaratna Samuccaya*. Tripathi ID, commentator. 2nd ed. Varanasi: Chaukhambha Orientalia; 2003. Chapter 2, verse 117. p. 34.
14. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 22nd Taranga, verses 69-78.
15. Vagbhatacharya. *Rasaratna Samuccaya with Vijnanabodhini commentary*. Kulkarni DA, commentator. New Delhi: Meharchand Lachhmandas Publications; 2020. Chapter 2, verse 117. p. 34.
16. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 24th Taranga, verses 19-22. p. 124.
17. Sarngadharacharya. *Sarngadhara Samhita with Dipika and Gudhartha Dipika commentaries*. Varanasi: Chaukhambha Bharati Academy; 2012. Madhyama Khanda 2/1. p. 144.
18. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. II. New Delhi: Government of India. Monograph 75. p. 5.
19. Sharma S, author. *Rasatarangini with Hindi commentary*. Shastri K, commentator. New Delhi: Motilal Banarsidass. 13th Taranga, verses 3-5. p. 307.
20. Mehta RM. *Pharmaceutics-I*. 6th ed. New Delhi: Vallabh Prakashan; 2021. p. 285-294.
21. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 3.1.3, Determination of pH. p. 291.
22. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 2.2.10, Loss on drying. p. 243.
23. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 2.2.3, Determination of total ash. p. 242.
24. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 2.2.4, Determination of acid-insoluble ash. p. 242.
25. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 2.2.7, Determination of water-soluble extractive. p. 243.
26. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IV. New Delhi: Government of India; 2008. Appendix 2.2.6, Determination of alcohol-soluble extractive. p. 243.

27. Sulaiman CT, Jyothi CK, Unnithan GK, Prabhukumar KM, Balachandran I. Phytochemical characterization and evaluation of antiurolithiatic activity of selected source plants of *Pashanabheda*. *Clin Phytosci*. 2022; 8:12. doi:10.1186/s40816-022-00344-1.
28. Das K. *A Textbook of Instrumental Methods of Analysis*. Pune: Nirali Prakashan; 2021. p. 3.22.
29. Government of India, Ministry of AYUSH, Pharmacopoeia Commission for Indian Medicine & Homoeopathy. *The Ayurvedic Pharmacopoeia of India*. Part II (Formulations). Vol. IV. Ghaziabad: Pharmacopoeia Commission for Indian Medicine & Homoeopathy; 2017. Appendix 2.4.10, Determination of heavy metals.
30. Wilson E, Rajamanickam GV, Dubey GP, Klose P, Musial F, Saha FJ, et al. Review on shilajit used in traditional Indian medicine. *J Ethnopharmacol*. 2011;136(1):1-9. doi: 10.1016/j.jep.2011.04.033.
31. Deore SL, Moon KV, Khadabadi SS, Deokate UA, Baviskar BA. Evaluation of toxicity of Vatsanabha (*Aconitum ferox*, Ranunculaceae) before and after Shodhana. *J Young Pharm*. 2013;5(1):3-6. doi: 10.1016/j.jyp.2013.01.001.
32. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. *The Ayurvedic Pharmacopoeia of India*. Part I. 1st ed. New Delhi: Government of India; 2001.
33. Dhanvantari. *Dhanvantari Nighantu*. Sharma PV, editor. Varanasi: Chaukhambha Orientalia. Shatpushpadi Varga, verses 71-72.
34. Singh PK, Singh J, Medhi T, Kumar A. Phytochemical screening, quantification, FT-IR analysis, and in silico characterization of potential bio-active compounds identified in HR-LC/MS analysis of the polyherbal formulation from Northeast India. *ACS Omega*. 2022;7(37):33067-33078. doi:10.1021/acsomega.2c03117.
35. Government of India, Ministry of AYUSH, Pharmacopoeia Commission for Indian Medicine & Homoeopathy. *The Ayurvedic Pharmacopoeia of India*. Part I. Vol. IX. Ghaziabad: Pharmacopoeia Commission for Indian Medicine & Homoeopathy; 2016. Appendix 3.1.1, Test for heavy metals (permissible limits).

How to cite this article: Preeti, Pandey P, Shukla GS, Agarwal R, Goyal M, Singh RP. Pharmaceutico-analytical assessment of amrutadi ashmarihar yog: an ayurvedic herbo-mineral formulation. *Int J Health Sci Res*. 2026; 16(9):320-331. doi: [10.52403/ijhsr.20260935](https://doi.org/10.52403/ijhsr.20260935)
