

Pharmaceutico-Analytical Study Of A Herbo-Mineral Formulation- Amrit Manjari Rasa

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ABSTRACT

Herbo-mineral formulations represent a specialized domain of Ayurvedic pharmaceuticals described under Rasa Shastra, integrating herbal drugs with processed metals and minerals to enhance therapeutic efficacy and bioavailability. Amrit Manjari Rasa, a classical formulation indicated in Jwara (fever), respiratory ailments, and Vata-Kapha predominant disorders, requires meticulous pharmaceutical processing, including Shodhana (purification) and Bhavana (levigation), to ensure safety and therapeutic potency. In the modern context, concerns regarding quality, safety, and standardization necessitate systematic pharmaceutical and analytical evaluation of such formulations. Methods: The present study involved the pharmaceutical preparation and analytical evaluation of Amrit Manjari Rasa following classical references. Raw drugs including Hingula, Tankana, and Vatsanabha were procured and authenticated, followed by prescribed Shodhana procedures. The formulation was prepared through Bhavana using Nimbu Swarasa and converted into Vati form. Analytical assessment of raw materials and the final product was carried out using classical Ayurvedic parameters along with modern physicochemical and instrumental techniques, as per standard protocols of the Ayurvedic Pharmacopoeia of India (2008), CCRAS guidelines, and AYUSH standards. Results: The pharmaceutical procedures resulted in a uniform and stable formulation with acceptable organoleptic and physicochemical characteristics. Analytical findings confirmed the absence of harmful impurities and validated the quality and safety of the processed ingredients. The formulation complied with standard parameters, demonstrating appropriate particle size reduction, homogeneity, and stability. Discussion: The study highlights the significance of classical pharmaceutical processes such as Shodhana and Bhavana in enhancing the safety, bioavailability, and therapeutic efficacy of Herbo-mineral formulations. Integration of modern analytical techniques with traditional evaluation methods ensures quality control, reproducibility, and compliance with regulatory standards. This combined approach strengthens the scientific validation and global acceptability of Ayurvedic medicines. Conclusion: The pharmaceutical and analytical evaluation of Amrit Manjari Rasa establishes a standardized methodology for its preparation and quality assessment. The findings support its safety, consistency, and therapeutic potential when prepared according to classical guidelines and validated through modern analytical tools...

Keywords: Amrit Manjari Rasa, Rasendra Sara Sangraha Pharmaceutical processes, Analytical Techniques, Quality parameters

How to cite this article: Yadav M, Bhardwaj R, Pharmaceutico-Analytical Study Of A Herbo-Mineral Formulation- Amrit Manjari Rasa..Int J Drug Deliv Technol. 2026;16(21s): 410-418. DOI: 10.25258/ijddt.16.21s.42

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Herbo-mineral formulations constitute a distinctive and advanced domain of pharmaceuticals in Ayurveda, particularly elaborated under *Rasa Shastra*. These formulations integrate herbal drugs with processed minerals and metals to enhance therapeutic potency, stability, and bioavailability. Among such formulations, *Amrit Manjari Rasa*¹ is a classical preparation widely indicated in *Jwara* (fever), respiratory disorders, and metabolic disturbances predominantly associated with *Vata-Kapha Dosha*. The present study was designed and carried out as a part of Ph.D. work at Desh bhagat Ayurvedic college & Hospital, DB University, Punjab, India. The preparation of Herbo-mineral medicines involves meticulously designed pharmaceutical procedures, primarily *Shodhana* (purification), *Mardana* and *Bhavana*, which transform raw metals and minerals into therapeutically suitable and biologically assimilable forms. These processes are not merely detoxification steps but are considered essential for potentiating the pharmacological efficacy and safety of the formulation. In the case of *Amrit Manjari Rasa*, ingredients such as *Hingula* (cinnabar), *Tankana* (borax), and *Vatsanabha* (*Aconitum ferox*) undergo specific purification procedures prior to formulation, ensuring reduced toxicity and enhanced therapeutic action.²⁻³

The pharmaceutical preparation of *Amrit Manjari Rasa* typically involves fine trituration (*Bhavana*) of purified ingredients with suitable liquid media such as *Nimbu Swarasa* (lemon juice), followed by the preparation of *Vati* (tablets/pills). This process facilitates uniform mixing, particle size reduction, and potentiation of drug action through repeated levigation.⁴ The incorporation of herbal components like *Pippali* (*Piper longum*), *Maricha* (*Piper nigrum*), and *Javitri* (*Myristica fragrans*) contributes to its *Deepana* (digestive stimulant) and *Pachana* (metabolic enhancer) properties, further augmenting the bioavailability of mineral constituents.

In the contemporary pharmaceutical landscape, standardization and quality control of Herbo-mineral formulations have become crucial due to concerns regarding safety, reproducibility, and regulatory compliance. Variability in raw materials, improper

processing, and lack of standardized protocols may lead to issues such as heavy metal toxicity and batch-to-batch inconsistency⁵ Therefore, it is essential to evaluate the preparation of *Amrit Manjari Rasa* using both classical guidelines and modern analytical techniques to ensure its safety, efficacy, and quality.

Analytical Study of *Amrit Manjari Rasa*: Analytical evaluation is a critical component in the standardization of Ayurvedic Herbo-mineral formulations such as *Amrit Manjari Rasa*, ensuring their safety, efficacy, and reproducibility. It involves a systematic assessment of both raw materials and the finished product using classical Ayurvedic parameters alongside modern scientific techniques. Authentication of herbal and mineral ingredients is essential, as the therapeutic effectiveness of the formulation depends directly on the quality and purity of its constituents. In Herbo-mineral preparations, this assumes greater importance due to the involvement of metals and minerals that require precise processing through *Shodhana* and *Bhavana* to render them safe and bio-assimilable. Analytical studies facilitate the detection of impurities, adulteration, and toxic elements, thereby ensuring compliance with classical standards and modern pharmacopeial requirements. The finished formulation is further evaluated using traditional tests and contemporary physicochemical and instrumental analyses to confirm its quality, stability, and safety profile. Such evaluation also ensures batch-to-batch consistency and supports quality control, enhancing the scientific credibility and global acceptance of Ayurvedic medicines. The analytical parameters in the present study were assessed in accordance with standard guidelines, including protocols issued by the Department of AYUSH, the Ayurvedic Pharmacopoeia of India⁶ (2008), and CCRAS laboratory manuals⁷, with testing conducted at recognized drug testing laboratories. The present study was designed to systematically document and analyze the pharmaceutical preparation of *Amrit Manjari Rasa*, including raw drug procurement, authentication, processing methods, and formulation techniques, to establish a standardized approach for its manufacturing and quality assessment.

Materials and Methods:

Study Design: The present study was designed as a pharmaceutical standardization study to systematically document the preparation of *Amrit Manjari Rasa* in accordance with classical Ayurvedic texts and to evaluate its analytical parameters using modern quality control techniques.

Raw Materials:

Procurement of Raw Drugs: All raw materials were procured from authenticated sources from local market -

Ashuddha Hingula (Cinnabar)

Ashuddha Tankana (Borax)

Ashuddha Vatsanabha (Aconitum ferox)

Pippali (*Piper longum*)

Maricha (*Piper nigrum*)

Javitri (*Myristica fragrans*)

Authentication of Raw Drugs: All herbal drugs were authenticated based on macroscopic and microscopic characteristics as per standard Ayurvedic pharmacopoeia guidelines.⁸ Mineral drugs were

identified through classical tests and physicochemical parameters

Pharmaceutical Procedures (SOP): It is carried out in steps-

Step 1. Shodhana (Purification of Raw Drugs)

1.1 Shodhana of Hingula⁹ (Cinnabar) -

Method: Triturated with *Nimbu Swarasa*.

Duration: 21 hours (Seven Bhavana) until a fine, homogeneous mass was obtained.

Its purpose was to remove impurities and enhance bioavailability¹⁰.

1.2 Shodhana of Tankana¹¹ (Borax)

Method: Heated in an iron pan until effervescence ceases and a porous, anhydrous form (*Shuddha Tankana*) was obtained.

Its purpose was removal of water content and impurities.

1.3 Shodhana of Vatsanabha¹² (Aconitum ferox)

Method: Roots were soaked in cow urine (*Gomutra*) for 3 days, then peeled and dried.

Its purpose is detoxification of toxic alkaloids¹³.

Table 1. Comparative overview of Shodhana techniques & Significance

Parameter	<i>Hingula</i>	<i>Tankana</i>	<i>Vatsanabha</i>
Drug Type	Mineral	Mineral	Toxic herbal
English name	Cinnabar	Borax	Aconitum ferox
Risk Without Shodhana	Heavy metal toxicity	Impurities, instability	Severe toxicity (cardiotoxic, neurotoxic)
Shodhana Type	Wet trituration (<i>Bhavana</i>)	Heating (<i>Uttullikarana</i>)	Soaking (<i>Nimajjana</i>)
Media Used	Lemon juice	None	<i>Gomutra</i>
Duration	21 Hours	Until effervescence stops (approx. 2Hrs)	3-4 days
Objective	Purification & particle size reduction	Dehydration & purification	Detoxification
Result	Fine, lusterless orange-red powder	White porous anhydrous powder	Brownish color material

Key Transformation	Increased fineness and homogeneity	Removal of water content	Reduction of toxic principles
Pharmaceutical Importance	Enhances absorption	Improves stability	Ensures safety
Contribution to Final Drug	Antipyretic, <i>Rasayana</i> effect	Digestive & catalytic role	Analgesic, stimulant effect
Yield (%)	109.5%(pre-wash)	62.31%	77%

Step 2: Preparation of *Churna* (Powder)

All purified ingredients along with herbal drugs (*Pippali*, *Maricha*, *Javitri*) were dried and pulverized separately.

Table 2. Powder Processing and Yield Analysis of herbal material

S. No.	Drug	Loss (%)	Yield (%)	Observation	Inference
1	<i>Javitri</i>	27	73	Fibrous, hard to powder	Removal of non-medicinal fibers
2	<i>Pippali</i>	22	78	Moisture content high	Drying is essential for stability
3	<i>Maricha</i>	9	91	Easy pulverization	Suitable for fine powder

Powders were sieved through a fine mesh (No.- 80) to ensure uniform particle size.

Step 3: Mixing and *Bhavana* (Trituration)

All ingredients were mixed in equal proportions as per classical reference.

Nimbu Swarasa was added as *Bhavana Dravya*.

Table 3. Bhavana Process Outcomes of Amrit Manjari Rasa

Parameter	Observation	Significance
Total Bhavana cycles	7	Ensures homogeneity
Total duration	21 hours	Intensive particle size reduction
pH of AMR	~4.29	Enhances solubility

Consistency change	From rough to smooth paste	Indicates proper levigation
Final form	Cohesive mass	Suitable for Vati formation

Trituration was carried out continuously for 3 hours daily for 7 days until a uniform, soft, and cohesive mass was formed. Its purpose was to enhance drug potency, ensure uniform mixing, and facilitate nanoparticle size reduction¹⁴.

Organoleptic and Physical Changes observed during Processing of Vati:

Table 4. Observed Transformations During Processing

Parameter	Initial State	Final State	Significance
Color	Brownish/red	Dull red	Mixing all ingredients properly
Texture	Rough, fibrous	Smooth, cohesive	Proper trituration
Odor	Mild	Pungent aromatic	Presence of herbal actives
Consistency	Powder	Semi-solid paste	Suitable for Vati

Step 4: Preparation of Vati (Tablet/Pill Formation)

The final triturated mass was rolled into small pills of approximately 125 mg (1 Ratti) each.

Pills were prepared manually to ensure uniformity.

Step 5: Drying

Prepared *Vatis* were dried under shade at room temperature.

Direct sunlight was avoided to prevent degradation of active constituents.

Step 6: Storage

The dried formulation was stored in airtight glass containers. Stored in a cool and dry place to maintain stability and prevent contamination.

Analytical Study: Results and Analytical Outcomes of Amrit Manjari Rasa:

Standardization was carried out as per API¹⁵ (Ayurvedic Pharmacopoeia of India) guidelines. All procedures were performed under hygienic and controlled laboratory conditions.

Organoleptic Evaluation: Color, odor, taste, and texture were recorded. (Shown in Table 4)

Physicochemical Parameters: Loss on drying, Ash value (total ash, acid-insoluble ash), pH value, Extractive values (water and alcohol soluble)-

Table 5 – Showing Physicochemical Parameters of *Amrit Manjari Rasa*

S. No.	Parameter	Observed Value	Standard/Inference
1	pH	4.29	Acidic; supports solubility & preservation
2	Loss on Drying (LOD)	9.60%	Within acceptable limit (<10%)
3	Total Ash	16.56%	Indicates mineral-rich composition
4	Acid Insoluble Ash	2.76%	Low contamination (siliceous matter)
5	Water Soluble Extractive	12.80%	Good bioavailability in aqueous medium

The acidic pH (4.29) confirms effective incorporation of *Nimbu Swarasa* during *Bhavana*, enhancing solubility of mineral constituents (*Hingula*, *Tankana*) and providing natural antimicrobial preservation. The LOD value (9.60%) indicates optimal moisture content, ensuring both stability and cohesiveness of the formulation. Total ash (16.56%) reflects the significant mineral fraction, while low acid-insoluble ash (2.76%) confirms minimal contamination and effective purification (*Shodhana*). The water-soluble extractive value (12.80%) supports rapid drug availability, correlating with the classical concept of *Kshipra-karitvam* (quick action).

Tablet Evaluation Parameters¹⁶:

Table 6 -Showing Tablet Quality Control Parameters

S. No.	Parameter	Observed Value	Standard/Inference
1	Hardness	5.0 kg/cm ²	Optimal mechanical strength
2	Friability	0.03%	Excellent (<1%)
3	Disintegration Time	40–45 min	Suitable for Herbo-mineral Vati
4	Weight Variation	-18.84% to +19.94%	Within permissible range ($\pm 20\%$)

Microbial Load Assessment

Table 7-Showing Microbial Limit Test (MLT)

S. No.	Parameter	Observed Value	Permissible Limit ¹⁷ (API/WHO)
1	Total Aerobic Microbial Count (TAMC)	500 CFU/g	≤ 1000 CFU/g

2	Total Yeast & Mold Count (TYMC)	<10 CFU/g	≤100 CFU/g
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Source: Microbial analysis performed as per API and WHO guidelines [1,4].

Table 8 - Aflatoxin level in Amrit Manjari Vati

S. No.	Aflatoxin Type	Result	Limit of Quantification ¹⁸ (LOQ)
1	Aflatoxin B1	BLQ	0.5 µg/kg
2	Aflatoxin B2	BLQ	0.5 µg/kg
3	Aflatoxin G1	BLQ	0.5 µg/kg
4	Aflatoxin G2	BLQ	0.5 µg/kg

The microbial load was well within permissible limits, confirming hygienic processing and safety of the formulation. The acidic pH, low moisture content, and presence of antimicrobial constituents contributed to the self-preservative nature of the formulation.

All aflatoxins were below the limit of quantification, indicating absence of fungal contamination and ensuring safety for clinical use. This validates proper storage and processing of raw materials.

DISCUSSION

Pharmaceutical Findings of Amrit Manjari Rasa

The pharmaceutical preparation of *Amrit Manjari Rasa* involves systematic *Shodhana* of mineral and toxic herbal ingredients, followed by *Churna Nirmana* and *Bhavana*. These processes collectively ensure detoxification, particle size reduction, enhanced bioavailability, and therapeutic potentiation of the formulation.

Shodhana of Hingula (Cinnabar): The purification of *Hingula* using *Nimbu Swarasa* (pH ~3) demonstrated effective removal of impurities and surface activation. Prolonged trituration (21 hours) resulted in significant particle size reduction, transitioning from crystalline “needle-like” structures to fine, bright red powder. The increase in weight (~9.5%) prior to washing suggests adsorption of

organic components, while subsequent *Prakshalana* restored neutrality (pH 7), ensuring safety. These transformations enhance the drug’s dispersion and absorption in biological systems.

Shodhana of Tankana (Borax): Thermal processing (*Utpullikaran*) resulted in dehydration of *Tankana*, evidenced by effervescence and formation of porous, amorphous material. The observed weight loss (37.68%) corresponds to removal of water of crystallization. The resultant structure exhibited increased surface area, which is essential for its *Kaphachhedana* (mucolytic) action. The process also improved palatability and reduced gastric irritation.

Shodhana of Vatsanabha (Aconitum ferox): The detoxification of *Vatsanabha* through immersion in *Gomutra* (alkaline pH ~9) facilitated hydrolysis of toxic alkaloids such as aconitine into less toxic derivatives. Observable changes, including discoloration of medium and removal of outer layers, confirmed extraction of toxic components. Final yield (77%) reflects removal of undesirable fractions. Neutral washing ensured elimination of residual toxins, making the drug safe for therapeutic use.

Fine powdering using Sieve No. 80 ensured uniform particle size, enhancing surface area and facilitating homogenous mixing. Material loss corresponds to

removal of fibrous and non-active components, improving formulation quality.

The repeated *Bhavana* with *Nimbu Swarasa* facilitated:

Reduction of particle size to micro-level

Uniform distribution of mineral and herbal components

Formation of a stable matrix through organic binding

Enhancement of bioavailability via acidic activation

The progressive reduction in liquid requirement during successive levigations indicates saturation and improved absorptive capacity of the drug matrix.

The hardness (5.0 kg/cm²) indicates adequate mechanical strength to withstand handling while allowing proper disintegration. Extremely low friability (0.03%) demonstrates excellent resistance to abrasion and ensures dose uniformity. The disintegration time (40–45 minutes) reflects a controlled release pattern, suitable for Herbo-mineral formulations. Weight variation within $\pm 20\%$ confirms acceptable uniformity for manually prepared *Vatis*.

CONCLUSION

Overall Pharmaceutical & Analytical Outcome

The pharmaceutical study confirms that classical processing techniques effectively transform raw materials into a safe, bio-assimilable, and therapeutically potent formulation. *Shodhana* ensures detoxification and purity, *Churna Nirmana* provides uniformity, and *Bhavana* enhances bioavailability and stability. The integration of mineral and herbal components through these processes results in a synergistic formulation with optimized pharmaceutical properties. The analytical evaluation establishes that *Amrit Manjari Rasa* meets essential quality standards in terms of physicochemical properties, tablet characteristics, microbial safety, and absence of aflatoxins. The formulation demonstrates a stable pharmaceutical profile. These findings provide a scientific validation and quality benchmark (fingerprint) for the formulation, supporting its safe and effective clinical application, providing scientific data for future research.

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