

AYASKRITI: A CRITICAL SCHOLARLY REVIEW OF CLASSICAL IRON PREPARATIONS IN AYURVEDA WITH CONTEMPORARY BIOMEDICAL CORRELATIONS

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ABSTRACT

Ayurveda, the ancient system of Indian medicine, encompasses a sophisticated pharmacopoeia that integrates both botanical and mineral-metallic therapeutics. Among these, preparations derived from Loha dhatu (iron) occupy a distinctive position by virtue of their elaborate processing methodology and expansive clinical applicability. 'Ayaskriti' represents a paradigmatic class of iron-based pharmaceutical formulations whose preparatory procedures, as codified in the Brihatrayi — the Charaka Samhita, Sushruta Samhita, and Ashtanga Sangraha — embody a systematic, multi-step processing protocol that achieves the bioavailability transformation of elemental iron into therapeutically viable forms.^[12] The classical texts delineate three distinct pharmaceutical forms of Ayaskriti: *Churna* (fine powder), *Avleha* (medicated electuary), and *Sandhan* (fermented syrup) — each possessing a unique pharmacokinetic profile, dosage paradigm, and therapeutic

domain.^[23] This critical review synthesises the classical preparatory methodologies with their modern biomedical equivalents, illuminating the mechanistic rationale underlying the processing steps and proposing contemporary disease correlations for evidence-informed clinical application.

KEYWORDS: *Ayaskriti; Loha dhatu; Brihatrayi; Nirvapana; Marana procedure; Iron bioavailability; Rasashastra; Sandhan Kalpana.*

1. INTRODUCTION

The therapeutic deployment of metals and minerals in Ayurveda constitutes one of its most intellectually sophisticated pharmacological frontiers. Classical Ayurvedic scholarship recognised, millennia before modern trace element physiology, that transition metals such as iron (Loha), gold (Suvarna), silver (Rajata), and copper (Tamra) possess potent curative properties when subjected to precise pharmaceutical transformations.^[1]

The science of Rasashastra, which formally systemised mineral and metal pharmacology from approximately the 8th century CE onwards, codified these transformation procedures under the umbrella term *Marana* — a series of thermal and chemical operations designed to render metals biologically absorbable, pharmaceutically potent, and organoleptically acceptable.^[13]

However, the antecedents of metal-based therapeutics in Ayurveda significantly predate Rasashastra's formal emergence. The foundational classical texts — the Charaka Samhita, Sushruta Samhita, and Ashtanga Sangraha — document a specialised category of iron preparations under the designation *Ayaskriti*. Etymologically, the term resolves into *Ayas* (iron; a ferrous metal) and *Kriti* (formation; a methodically crafted preparation), thereby connoting a systematically processed iron pharmaceutical.^[12]

Acharya Charaka introduced this preparation in the first chapter of Chikitsa Sthana under the epithet *Loha Rasayana*, underscoring its rejuvenating and disease-modifying properties.¹ Acharya Sushruta, in the tenth chapter of Chikitsa Sthana, provided a comprehensive taxonomic elucidation, classifying *Ayaskriti* into three discrete pharmaceutical forms, each with distinct preparatory steps and clinical utility profiles.^[2]

Importantly, while the nomenclature centres on iron, the preparatory paradigm described therein is extensible to other metals — gold, silver, copper — thereby constituting a generic

metallic pharmaceutical processing template within classical Ayurvedic pharmacology. This attribute reflects the profundity of classical pharmacists' understanding of metal-organic interactions and their biopotential through iterative thermal and solvent processing.^[13]

2. PHARMACEUTICAL FORMS OF AYASKRITI

2.1 Ayaskriti in Churna (Powder) Form

The preparation of Ayaskriti in its powdered (Churna) form is attributed primarily to Acharya Sushruta, who describes it as the first among the three canonical variants. The process exemplifies an elegant integration of mechanical, thermal, and phytochemical operations directed at maximising the bioavailability of metallic iron.^[2]

Step I: Lepana (Surface Priming with Lavana Paste)

Thin sheets of *Tikshna Loha* (high-grade, sharpened iron; commercially correlatable to wrought or low-carbon iron) are selected as the base substrate. A paste of *Lavana* (saline/salt compound) is uniformly applied across all surfaces of these sheets. The *Lavana* coating serves a dual function: it promotes surface oxidation to increase reactive surface area and acts as a flux-like agent facilitating subsequent metallic transformation during heat treatment.^[23]

Step II: Nirvapana (Iterative Quenching — 16 Cycles)

The *Lavana*-coated iron sheets are subjected to intense direct heat until they achieve a red-hot state, indicative of temperatures approximating 700–900°C. These thermally activated sheets are then immediately quenched by immersion into a liquid medium consisting of *Triphala-Shalasaradi Kashaya* — a polyherbal decoction combining the tannin-rich *Triphala* (*Haritaki*, *Bibhitaki*, *Amalaki*) with the *Shalasaradi* group of anti-inflammatory and carminative herbs. This thermal quenching process is systematically repeated for 16 cycles (*Shodasha Nirvapana*).^[2]

From a modern materials science and biomedical perspective, the iterative quench-heating cycle progressively transforms the crystalline structure of iron, induces micro-fragmentation, and facilitates the incorporation of phytoconstituents — particularly tannins, organic acids, and polyphenols — onto the metal surface, thereby creating organo-metallic complexes of enhanced bioavailability.^[23]

Step III: Churna (Reduction to Fine Powder)

Following the completion of the Nirvapana cycles, the processed iron sheets are subjected to a final round of heating over Khair wood (*Acacia catechu*) charcoal heat — a fuel known for its high, sustained thermal output. After natural self-cooling, the sheets are mechanically triturated and filtered through fine cloth to yield a microfine iron powder.^[2] The resulting product, characterised by an extremely small particle size, approximates the physical properties of nano-iron or sub-micron iron particles, consistent with contemporary understandings of Bhasma preparations in Rasashastra.^[3]

2.2 Ayaskriti in Avleha (Electuary/Paste) Form

The Avleha formulation of Ayaskriti is comprehensively described by Acharya Charaka in the context of Loha Rasayana (Cha. Chi. 1/3/23), representing a sophisticated long-term pharmaceutical preparation designed for systemic rejuvenation and chronic disease management.^[12]

Step I: Nirvapana (Phytochemical Quenching)

Iron sheets of precise dimensions (4 × 4 Anguli with sesame-seed thickness, approximately 4 × 4 cm with 3–4 mm thickness) are rendered red-hot under intense heat. These sheets are then successively quenched in five distinct liquid media: *Triphala Kwath* (polyherbal astringent decoction), *Gomutra* (bovine urine — a documented source of urea, ammonia, and trace minerals), *Jyotishmati Kshar udaka* (alkaline extract of *Celastrus paniculatus* — a neuroprotective herb), *Ingudi Kshar udaka* (alkaline extract of *Balanites aegyptiaca* — hepatoprotective and antimicrobial), and *Palash Kshar udaka* (alkaline extract of *Butea monosperma* — rich in flavonoids and anthelmintic compounds). The quenching in alkaline media is particularly significant as it promotes formation of iron oxide and iron hydroxide complexes, which modern research identifies as precursors to highly bioavailable iron forms.^[123]

The completion of this process is confirmed by a macroscopic change: the iron sheets acquire a uniformly dark black (Anjana-like) coloration, indicating comprehensive surface transformation and successful organo-metallic complex formation.^[2]

Step II: Churna (Intermediate Powder Preparation)

The blackened iron sheets are subjected to intensive trituration to yield a fine powder. This intermediate stage ensures homogeneous mixing with adjuvants in subsequent processing steps.^[1]

Step III: Avleha Formation (Electuary Preparation)

The iron powder is amalgamated in equal proportions with *Madhu* (honey — a hygroscopic vehicle rich in enzymes, antioxidants, and organic acids) and *Amalaki Swarasa* (fresh juice of *Phyllanthus emblica* — the richest documented botanical source of ascorbic acid). The scientific rationale here is compelling: ascorbic acid is a premier dietary enhancer of non-haem iron absorption, operating through reduction of ferric (Fe^{3+}) to ferrous (Fe^{2+}) iron and chelation of soluble iron complexes in the gastrointestinal milieu.^[13]

Step IV: Kala Samskara (Temporal Maturation — 12-Month Fermentation)

The freshly prepared electuary is transferred into a vessel pre-treated with ghee (clarified butter) and buried within a heap of *Yava rashi* (barley grains) for a maturation period of one year. During this interval, the contents are thoroughly remixed on a monthly basis before being repositioned. Upon completion of the maturation period, the Avleha is prescribed for administration co-administered with Ghrita (ghee) and Madhu (honey).^[12]

This extended temporal maturation (Kala Samskara) represents a sophisticated pharmaceutical concept with modern analogues in fermentation biochemistry. The barley-grain burial creates a controlled microenvironment conducive to enzymatic activity, mild fermentation, and gradual pH modulation. The monthly mixing ensures homogeneous distribution of bioactive phytoconstituents and prevents the separation of iron particles. The overall effect is a pharmacodynamically enriched preparation with enhanced organoleptic properties and improved absorption kinetics.^[13]

2.3 Aushadhi Ayaskriti (Paste Form — Sushruta's Classification)

Acharya Sushruta additionally delineates a variant designated as *Aushadhi Ayaskriti* — a paste-form preparation involving a more elaborate herbo-mineral processing protocol. This variant is distinguished by its utilisation of a broader herbal base and a specialised processing vessel.^[2]

1. Swarasa (Expressed Juice Collection): Fresh plant juices (Swarasa) from 12 specific herbs enumerated in Su. Chi. 10/12 are extracted and collected.^[2]

2. Palash Droni (Vessel Specification): The collected Swarasa is stored in a vessel crafted from Palash wood (*Butea monosperma*), a material with established antifungal and antimicrobial properties, ensuring microbial stability of the liquid medium.^[23]
3. Nirvapana of Iron Balls (21 Cycles): Iron balls (rather than sheets) are repeatedly heated to red-hot state and quenched in the Swarasa within the Palash vessel for 21 iterative cycles — an increased quenching frequency compared to the powder form, ensuring greater phytochemical impregnation.^[2]
4. Kwath Reduction (Decoction to One-Quarter Volume): The phytochemically enriched Swarasa is then transferred to a separate vessel and concentrated by heating to one-quarter of its original volume. This concentration step amplifies the density of bioactive phytoconstituents.^[2]
5. Secondary Nirvapana (Sheets in Concentrated Kwath): Thin iron sheets are then quenched in the concentrated Kwath — a secondary round of phytochemical impregnation at higher constituent concentration.^[2]
6. Avleha Formation: The processed iron sheets are finally blended with double quantities of Pippali (*Piper longum*) powder — a documented bioavailability enhancer (bioperine equivalent) — along with Madhu (honey) and Ghrita (ghee) to achieve the final electuary consistency.^[2,3]

2.4 Mahaushadhi Ayaskriti (Sandhan — Fermented Syrup Form)

The third and most pharmacodynamically complex form of Ayaskriti is *Mahaushadhi Ayaskriti*, described by Acharya Sushruta as a Sandhan Kalpana — a fermented pharmaceutical preparation analogous to modern galenical fermented tonics. The fermentation dimension introduces a dimension of probiotic and metabolic enrichment absent from the simpler forms.^[2]

1. Kwath (Decoction Preparation): A decoction of the Shalasaradi Gana herbs is prepared. This group encompasses herbs with predominant Kapha-Pitta-balancing, anti-inflammatory, and hepatoprotective properties.^[2]
2. Nirvapana (Quenching in Shalasaradi Decoction): Thin iron sheets are heated to incandescence and quenched in the Shalasaradi Kwath, impregnating the metal surface with the bioactive constituents of this potent herbal consortium.^[2]
3. Sandhan (Fermentation — 15 to 30 Days): The quenched preparation is transferred to appropriate Sandhan Patra (fermentation vessels) and Pippali powder, Madhu (honey), and Guda (jaggery — a rich source of sucrose, iron, and B-vitamins) are incorporated as

fermentation substrates and adjuvants. Fermentation proceeds for 15 to 30 days under controlled conditions.^[2,3]

The Sandhan process induces controlled microbial fermentation wherein sugars from Guda and Madhu undergo glycolytic metabolism, generating organic acids, carbon dioxide, and bioactive secondary metabolites. The resulting reduction in pH facilitates the dissolution of iron complexes and enhances the formation of iron-organic acid chelates — forms of iron with superior enteric bioavailability. This preparation thus represents classical Ayurveda's equivalent of a modern therapeutic iron tonic with synergistic prebiotic and probiotic attributes.^[2,3]

3. CLINICAL UTILITY: CLASSICAL INDICATIONS AND CONTEMPORARY BIOMEDICAL CORRELATIONS

Acharya Charaka's seminal description of Lohadi Rasayana explicitly notes that the pharmaceutical paradigm of Ayaskriti is extensible to other metals — gold (Suvarna), silver (Rajata), copper (Tamra) — each modulated according to the desired therapeutic outcome. This acknowledgment of metallic specificity in clinical indication reflects an advanced pharmacological understanding of metal-receptor interactions.^[12]

The following table consolidates the three forms of Ayaskriti with their classical textual indications and their contemporary biomedical equivalents:

Ayaskriti Form & Dose	Classical Indications	Contemporary Correlations	References
Churna (Powder) Dose: 125–500 mg (as per Agni)	Kushtha, Prameha, Medoroga, Shotha, Pandu, Unmada, Apsmara; Rasayana	Dermatoses with Kapha vitiation; Type 2 Diabetes Mellitus; dyslipidaemia; anaemia; metabolic syndrome	Su. Chi. 10/11
Avleha (Electuary/Paste) Dose: 2–5 g (as per Agni)	Pan-Rasayana utility; Kushtha, Prameha, Medoroga, Shotha, Rajayakshma	Rasayana/rejuvenation; obesity and weight management; post-debility rehabilitation; Apatarpana-janya Vyadhi; wasting disorders; emaciation	Cha. Chi. 1/3/23; Su. Chi. 10/12
Sandhan (Fermented Syrup)	Kushtha, Prameha,	Chronic dermatological conditions; Prameha spectrum;	Su. Chi. 10/12

Ayaskriti Form & Dose	Classical Indications	Contemporary Correlations	References
Dose: 1 Shukti (\approx 24 mL/g)	Medoroga, Shotha, Rajayakshma (Sushruta)	haemorrhoids; anaemia; malabsorption syndromes; intestinal dysbiosis	

4. CRITICAL PHARMACOLOGICAL ANALYSIS AND CONTEMPORARY RELEVANCE

The preparatory protocols of Ayaskriti reveal a systematic pharmacological strategy that finds compelling parallels in modern biomedical iron chemistry. The Nirvapana (quenching) process, particularly in its multi-cycle iterative execution, fundamentally modifies the physicochemical state of elemental iron. Modern spectroscopic and diffractometric analyses of analogous Bhasma preparations have demonstrated the progressive formation of nanoscale particles, amorphous phases, and crystalline iron oxides (Fe_2O_3 , Fe_3O_4) — forms associated with enhanced mucosal uptake through non-classical iron absorption pathways.^[3]

The deliberate selection of quenching media — Triphala Kwath, Gomutra, various Kshar udaka preparations — demonstrates an empirically derived understanding of phytochemical modulation of metal bioavailability. Polyphenols from Triphala act as iron chelators that stabilise ferrous iron and prevent gastric oxidation to the less absorbable ferric form. Organic acids present in multiple quenching media create soluble iron-acid complexes that resist precipitation at intestinal pH.^[123]

The incorporation of Amalaki swarasa (ascorbic acid) in the Avleha form is particularly noteworthy. Ascorbic acid is well-documented as the most potent dietary enhancer of non-haem iron absorption, capable of increasing iron bioavailability by 2–3 fold through its dual action as a reducing agent and chelator. The classical formulation thus achieves, through empirical reasoning, what modern iron-supplement formulations deliberately engineer through pharmaceutical science.^[13]

Similarly, the inclusion of Pippali (*Piper longum*) in Aushadhi Ayaskriti and Mahaushadhi Ayaskriti formulations aligns with modern research demonstrating piperine's bioavailability-enhancing properties — including inhibition of intestinal and hepatic metabolism, modification of gut transit time, and enhancement of membrane permeability for co-administered drugs and nutrients.^[3]

The Kala Samskara (12-month maturation) of Avleha represents perhaps the most sophisticated pharmaceutical intervention in the entire Ayaskriti system. Longitudinal storage in the Yava rashi microenvironment subjects the preparation to slow, controlled enzymatic and microbial transformation, producing a pharmacodynamically evolved product distinct from the freshly prepared electuary. This parallels the contemporary pharmaceutical concept of 'ageing' or 'conditioning' in certain biological and herbal medicinal preparations.^[13]

From a disease-correlation perspective, the classical indications — Prameha (diabetic spectrum), Medoroga (dyslipidaemia/obesity), Kushtha (chronic skin disorders), Pandu (anaemia), Shotha (oedema/inflammatory conditions), and Rajayakshma (wasting/consumptive diseases) — represent a coherent cluster of conditions associated with metabolic dysregulation, oxidative stress, tissue depletion, and micronutrient deficiency, in which iron-based supplementation with immunomodulatory herbal adjuvants would provide measurable therapeutic benefit.^[123]

5. CONCLUSION

Ayaskriti constitutes a remarkable chapter in Ayurvedic pharmaceutical science, demonstrating that classical scholars possessed an advanced, empirically derived understanding of metal bioavailability, phytochemical modulation, and pharmaceutical processing. The three pharmaceutical forms — Churna, Avleha, and Sandhan — represent a continuum of increasing pharmacological complexity, from a microfine iron powder to a fermented syrup enriched with phytochemicals, probiotics, and bioavailability enhancers.^[123]

The contemporary relevance of Ayaskriti is underscored by its well-documented indications across metabolic, haematological, and dermatological disorders — precisely the domains in which modern evidence is increasingly recognising the role of iron dysregulation, oxidative stress, and gut-metabolic axis dysfunction. Rigorous translational research employing modern analytical tools — ICP-MS, X-ray diffractometry, FTIR spectroscopy, and randomised clinical trials — is warranted to fully elucidate the bioavailability, pharmacokinetics, and therapeutic efficacy of these classical preparations, thereby facilitating their evidence-based integration into contemporary integrative medicine practice.^[123]

REFERENCES

1. Charaka Samhita, Chikitsa Sthana, Chapter 1, Verse 3/23. (Loha Rasayana). In: Tripathi B (Ed.). Chaukhamba Surbharti Prakashan, Varanasi; Reprint, 2009.

2. Sushruta Samhita, Chikitsa Sthana, Chapter 10, Verses 11–12. (Ayaskriti — three types).
In: Sharma AR (Ed.). Chaukhamba Surbharati Prakashan, Varanasi; Reprint, 2010.
3. Dwivedi R. Bhisakkarmasiddhi. Chaukhamba Bharti Academy, Varanasi; Reprint, 2005.