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Review Article

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"CHURNA, GHRITA, ASAVA-ARISHTA - AYURVEDIC FORMULATIONS AND PHARMACOLOGICAL PERSPECTIVES: AN INTEGRATIVE REVIEW"

Dr. Abhay Gandhi[1]

AFFLIATIONS:
1. Director, Ira Consultancy & Research Organisation, Bhosari, Pune, Maharashtra 411026

CORRESPONDENCE:
Dr. Abhay Gandhi
EMAIL ID: director@icro.co.in

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ABSTRACT

Introduction: Classical Ayurveda employs diverse dosage forms to deliver herbal medicines; among these, *Churna* (powder), *Ghrita* (herbal medicated ghee), and *Asava–Arishta* (fermented decoctions/wines) are central. These formulations alter pharmacokinetics, bioavailability, tissue targeting, and therapeutic actions — *churna* for rapid GI action and local effect, *ghrita* for deep *snehana*, *rasayana* and neuro-psycho-immunomodulation, and *asava–arishta* for bioavailability enhancement, long-term therapy, and gut–microbiome interactions. Modern pharmacology offers mechanistic explanations for these effects (lipid-mediated delivery, fermentation-derived metabolites, altered solubility of phytoconstituents). **Methods:** We conducted a narrative integrative review of classical Ayurvedic texts (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangdhara Samhita, Bhavaprakasha Nighantu*) and contemporary literature from PubMed, Scopus, Web of Science and Google Scholar (1950–2025). Search terms included "*churna* pharmacology," "medicated ghee *ghrita* pharmacokinetics," *"Asava Arishta* fermentation," "Ayurvedic formulations pharmacology," and specific formulation names. Included were pharmaceutics, pharmacokinetic, preclinical, clinical, and review studies. Exclusion criteria: anecdotal reports without methodological detail and non-translated classical commentaries. **Results:** Classical pharmaceutics describe preparation methods, indication matrices, and processing rationales *(Samskara).* Modern studies show: (1) *Ghrita* enhances delivery of lipophilic phytoconstituents across the gut and blood-brain barrier, modifies lymphatic uptake, and exerts immunomodulatory and neuroprotective effects; (2) *Churna* retains thermolabile constituents, provides rapid dissolution and activity in GI tract, and serves as an excipient for dose titration and local action; (3) *Asava–Arishta* fermentation produces low-alcohol matrices containing microbial metabolites, improves extraction of polar and semi-polar compounds, improves palatability and shelf stability, and influences host microbiota leading to systemic immunometabolic effects. Clinical reports support enhanced tolerability and efficacy of medicated *ghritas* and fermented formulations in chronic conditions (neurological disorders, digestive ailments, metabolic syndromes), while *churna* forms remain popular for acute GI and respiratory presentations. **Discussion:** Ayurvedic formulation science embeds pharmaceutic principles now recognizable in pharmaceutical sciences — solvent polarity tuning, lipid carriers, pro-drug/biotransformation via fermentation, and targeted tissue tropism via route and vehicle. Gaps include limited standardized pharmacokinetic data, variability in traditional methods, and scarce large randomized clinical trials comparing formulation types. **Conclusion:** *Churna, Ghrita,* and *Asava–Arishta* represent rational, time-tested dosage forms with distinct pharmacological profiles. Integrative research combining classical pharmaceutics, modern analytical chemistry, pharmacokinetics, microbiome science, and rigorous clinical evaluation will accelerate evidence-based adoption of these formulations in contemporary therapeutics.

KEYWORDS: *Asava, Arishta, Ghrita, Churna*, Formulation pharmacology

INTRODUCTION

Ayurvedic therapeutics places equal emphasis on *dravya* (drug), *guna* (qualities), *samskara* (processing), and *anupa* (vehicle).[1] Classical pharmaceutics *(Rasashastra* and *Bhaishajya Kalpana)* elaborate multiple dosage forms that are not mere carriers but active determinants of safety, efficacy, and tissue targeting.[2-3] Among these, *Churna* (coarse or fine powdered herbal mixtures), *Ghrita* (medicated clarified butter/ghee preparations), and *Asava–Arishta* (spontaneously fermented herbal decoctions/wines) are canonical and ubiquitous across text and practice.[4-5]

From an empirical standpoint, each formulation type addresses specific therapeutic needs: *Churna* for ease of administration and local GI action; *Ghrita* for deep nourishment (*Asthiposhana, Medhya, Rasayana*), lipid-soluble delivery, and neural tissue targeting owing to its lipid vehicle; [6-7] *Asava–Arishta* for chronic conditions requiring long-term dosing, palatability, and microbiologically mediated bio-activation. Modern pharmaceutics and pharmacology provide plausible mechanisms — lipid-mediated solubilization and lymphatic uptake, fermentation-mediated biotransformation producing secondary bioactive metabolites, and powder form affecting dissolution rates and gastric residence.[8]

This review aims to synthesize Ayurvedic classical principles and modern pharmacological evidence concerning *Churna, Ghrita,* and *Asava–Arishta*.[9] Objectives are to describe traditional preparation methods and rationales; summarize modern pharmacokinetic/pharmacodynamic and microbiome insights; present preclinical and clinical pharmacology evidence for each formulation; and identify research gaps and propose future directions to validate and standardize these dosage forms.[10]

MATERIALS AND METHODS

Search strategy[11]

A narrative integrative search was performed (January–March 2025). Electronic databases searched included PubMed, Scopus, Web of Science, Embase, and Google Scholar. Classical sources consulted: *Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangdhara Samhita, Bhaishajya Ratnavali, Bhavaprakasha Nighantu,* and standard commentaries and pharmacopeia.

Search terms[12]

Combinations of: *"Churna,"* "powder Ayurvedic formulation," *"Ghrita* pharmacology," "medicated ghee," *"Asava Arishta,"* "fermented Ayurvedic preparations," *"Bhaishajya Kalpana* pharmacokinetics," "Ayurvedic formulation AND microbiome," and specific examples (e.g., *"Brahmi Ghrita* pharmacology," "*Triphala Asava* fermentation").

Inclusion criteria[13]

- Experimental and review articles on pharmaceutics, pharmacokinetics, phytochemistry, microbiology, preclinical efficacy, and clinical studies of *Churna*, *Ghrita*, and *Asava/Arishta* (1950–2025).
- Classical textual descriptions with translational commentary.

Exclusion criteria[14]

- Anecdotal reports without methods, non-translated classical sources where meaning could not be reliably ascertained, and studies focused only on raw herbs without relation to formulation.

Data extraction and synthesis

Data extracted: classical preparation steps, rationale (*samskara*), vehicle (*anupana*), phytochemical changes during formulation, *in vitro/in vivo* pharmacokinetics, fermentation microbiota, clinical outcomes. Thematic synthesis was used (classical rationale → modern mechanistic correlate → preclinical/clinical evidence → limitations).[15]

OBSERVATION AND RESULTS

1. Classical pharmaceutics: definitions, preparation and rationales

***Churna* (powder):** *Churna* is powdered plant material — single herb (*ekadravya*) or compound (*kvatha/churna* mix). Classical texts emphasize particle size (coarse/fine), drying (*Ruksha guna* preservation), and immediate use. *Churna* is indicated for *Shodhana* (cleansing), digestive stimulation (*dipana*), and conditions where rapid GI exposure is needed (e.g., cough, constipation, fever). Its ease of mixing with water, honey, or ghee (anupana) allows dosing flexibility.

***Ghrita* (medicated ghee):** *Ghrita* is prepared by boiling a decoction/juice of herbs with ghee and often a base of milk or *kalka* (herbal paste) until water evaporates and oil phase collects — clarified butter infused with herbal actives. Processes like *Sneha paka* and *Kalka* incorporation aim to extract

lipophilic principles and impart *snehana* (oleation) and *rasayana* (rejuvenative) properties. Texts recommend *ghrita* for chronic neurodegenerative, reproductive, and systemic wasting disorders — given its capacity to penetrate *maha dhatus* and cross *srotas*.

***Asava* and *Arishta* (fermented medicines):** Prepared by boiling decoction with sugar or jaggery and fermenting with natural inocula (wild yeasts) until desired alcohol content (~2–12%) is reached. *Arishtas* use decoctions and are strained; *Asavas* start from concentrated decoctions and allowed to ferment. They are recommended for chronic digestive, metabolic, and *vata* disorders, where long-term palatability and slow systemic dosing are desired.

Classical rationales emphasize *samskara* (processing) changing drug qualities: drying concentrates heat-stable principles *(churna);* lipid infusion *(ghrita)* transforms drugs to *sara snigdha* (softening, nourishing) and enables *rasa–guna* shifting; fermentation *(asava/arishta)* confers *madya* (mild intoxicating) and *rasayana* effects and improves *anupana* acceptability.

2. Modern pharmacological correlates and physico-chemical transformations

***Churna* — dissolution, site specificity, and stability:** Powdered herbs show increased surface area → faster dissolution in gastric fluid; thermolabile constituents are preserved because *churna* preparation usually avoids high temperatures. This translates to rapid local GI exposure (e.g., carminatives, demulcents) and favorable immediate onset for GI symptoms. Excipients (honey, ghee, lukewarm water) modulate absorption.

***Ghrita* — lipid vehicle, lymphatic transport, and CNS delivery:** Medicated *ghrita* solubilizes lipophilic phytoconstituents (triterpenoids, sterols, fat-soluble vitamins) improving bioavailability. Lipid vehicles favor chylomicron formation and **intestinal lymphatic transport** — bypassing first-pass hepatic metabolism and increasing systemic availability of lipophilic actives. Experimental pharmacokinetics show increased plasma half-life and tissue retention for lipophilic constituents when delivered in ghee matrices versus aqueous extracts. Importantly, lipid carriers facilitate transport across the blood–brain barrier, aligning with *ghrita* use in neuropsychiatric and neurodegenerative disorders (e.g., *Brahmi ghrita*). Moreover, chronic *ghrita* administration modifies lipid-mediated signaling, inflammatory status, and immune profile (enhanced regulatory cytokines in animal models).

***Asava–Arishta* — fermentation, microbial metabolites, and host–microbe interactions:** Spontaneous fermentation transforms phytoconstituents: glycoside hydrolysis, deglycosylation, phenolic liberation, and formation of low molecular weight metabolites and organic acids. Fermentation increases extraction of polar compounds and yields microbial metabolites with unique bioactivity. The low alcohol content acts as a co-solvent stabilizing certain compounds and as a preservative. Fermented matrices also interact with gut microbiota: prebiotic substrates, microbial metabolites, and low alcohol might modulate microbiome composition, leading to immunometabolic outcomes. Studies demonstrate improved bioavailability of certain phenolics post-fermentation and distinct metabolic fingerprints (volatile metabolites) influencing palatability and systemic effects.

3. Preclinical pharmacology and mechanistic evidence

***Churna* studies:** Gastroprotective *churna* formulations (e.g., *Triphala churna*) demonstrate mucosal protection in ulcer models, antioxidative effects, and modulation of intestinal motility. Polyherbal *churna* powders often show stronger local anti-inflammatory action due to concentrated tannins and flavonoids.

***Ghrita* studies:** Medicated *ghritas* (e.g., *Brahmi Ghrita, Ksheera Basti Ghrita*) reveal neuroprotective effects in animal models — improved cognitive scores, reduced oxidative stress, and enhanced neuronal survival. Pharmacokinetic studies in rodents show higher brain concentrations of lipophilic actives from *ghrita* vs aqueous extracts. Immunomodulatory *ghritas* demonstrate enhanced phagocytic activity and altered cytokine balance (reduced pro-inflammatory IL-6, TNF-α; increased IL-10) in chronic treatment models. Bone healing and reproductive health benefits associated with certain *ghritas* align with classical *asthiposhana* and *varnya* claims.

***Asava–Arishta* studies:** *Triphala Arishta* and other fermented formulations show better glycemic control

and antioxidant capacity than their decoction counterparts in diabetic rodent models. Fermented preparations show altered metabolomic profiles and improved gut mucosal integrity, suggesting a gut-mediated systemic effect. Clinical pharmacology suggests *Asava/Arishta* matrices can modify absorption kinetics of polar phytochemicals, sometimes improving therapeutic index.

4. Clinical evidence and therapeutic niches

***Churna* (powder) clinical usage:** Widely used for acute GI disorders (constipation, indigestion), respiratory illnesses (herbal powders for cough), and dosing convenience. Studies on *Triphala churna* demonstrate improved bowel regularity, antioxidant effects, and improved markers in ulcerative colitis small trials.

***Ghrita* clinical use:** *Ghrita* formulations used in neurological disorders (Alzheimer's, memory impairment), postpartum recovery *(Stanya poshana)*, and chronic wasting diseases show symptomatic improvement in several small RCTs and observational studies. For example, *Brahmi Ghrita* and *Medhya ghritas* have been associated with cognitive improvement and improved sleep in pilot trials. Safety profiles are acceptable when sourced and prepared properly, though caloric/lipid content must be considered in metabolic disease.

***Asava–Arishta* clinical use:** Long-term therapy for chronic conditions (digestive, rheumatological, metabolic) — studies indicate improved GI symptoms, glycemic indices with certain *Arishtas*, and reduced steroid requirement in some inflammatory disorders. The palatability and adherence advantages are clinically important.

5. Safety, quality control, and standardization challenges

Standardization: Variability in raw herbs, solvent quality, heat treatment, and fermentation microflora leads to batch heterogeneity. Establishment of marker compounds (e.g., arjunolic acid in *Arjuna ghrita*) and microbial fingerprinting for *Asava/Arishta* is essential.

Safety: *Ghrita* caloric load is relevant in metabolic disorders; *Asava/Arishta* alcohol content (though low) may contraindicate in some populations; *churna* dust inhalation or allergenicity must be considered. Herbo-mineral interactions (if minerals or *bhasmas* added) require toxicological evaluation.

Regulatory: Existing pharmacopeial monographs (Ayurvedic Pharmacopoeia of India) provide some standards, but harmonized global standards and GMP for traditional processes are needed.

DISCUSSION

Integrating classical rationale with modern science

Ayurvedic formulation science is not empirical folklore; it codifies profound pharmaceutic principles. *Churna*, *Ghrita*, and *Asava–Arishta* are examples where vehicle and process fundamentally alter drug behavior.[16] Modern pharmacology recognizes these phenomena: lipid vehicles *(ghrita)* enabling lymphatic transport and CNS penetration; powders *(churna)* optimizing dissolution and local GI action; fermentation *(asava/arishta)* transforming phytochemicals and engaging the microbiome. Thus, the classical attributes of *sneha*, *ushna/shita*, and *madhura* qualities find mechanistic correlates in solvent polarity, thermomechanical processing, and microbial biotransformation.[17]

Clinical relevance and therapeutic decision-making

Formulation choice in Ayurveda is individualized — the same herb may be delivered as *churna*, *ghrita*, or *arishta* depending on disease phase, patient constitution, and objective (cleansing, nourishment, long-term therapy). Pharmacologically, this translates into tailoring absorption kinetics, tissue targeting, and systemic vs local effect profile. For chronic neurodegeneration, *ghrita* may enhance CNS delivery; for acute diarrhea or constipation *churna* offers rapid luminal action; for long-term metabolic modulation, fermented *Arishta* provides sustained exposure and microbiome-mediated benefits.[18]

Research gaps and priorities

Despite compelling mechanistic hints, high-quality pharmacokinetic data in humans comparing formulations are sparse. Standardization of manufacturing (temperature, timing, microbial starter cultures), chemical and metabolomic profiling pre- and post-formulation, and controlled clinical trials comparing formulation types for the same active phytoconstituent are urgently needed. Microbiome studies on Asava/Arishta are a promising frontier; mapping fermentation metabolites and host response will clarify mechanisms for systemic effects.[19]

Safety and translational concerns

Herbal formulations are often perceived as benign;

yet formulation vehicles change exposure. *Ghrita* increases lipid intake and can alter pharmacodynamics of concurrent drugs (lipophilic drug interactions). *Arishta* alcohol content, while low, can be clinically relevant. Quality control to prevent contamination, adulteration, and microbial overgrowth is necessary. Regulatory frameworks must balance traditional authenticity with contemporary safety and reproducibility.[20]

CONCLUSION

Churna, *Ghrita,* and *Asava–Arishta* exemplify Ayurvedic pharmaceutics where vehicle, processing, and long-standing empirical wisdom converge to create dosage forms with distinct pharmacological profiles. Modern pharmacology validates many classical observations: lipid carriers improve bioavailability and facilitate lymphatic and CNS delivery *(ghrita);* powders promote rapid luminal action and preserve heat-sensitive constituents *(churna);* fermentation yields unique metabolites and enhances extraction, palatability, and host–microbiome interactions *(asava/arishta)*. Together, these dosage forms enable tailored therapeutics across acute and chronic diseases.

To translate these formulations into evidence-based practice, focused research is needed: standardized manufacturing protocols, chemical and metabolomic fingerprinting, pharmacokinetic and tissue distribution studies comparing formulations, controlled clinical trials assessing clinical endpoints and safety, and microbiome interaction studies for fermented medicines. Harmonizing classical knowledge with modern analytical and clinical methods will not only validate traditional dosage forms but also open avenues for novel drug delivery strategies inspired by Ayurveda.

In summary, *Churna*, *Ghrita,* and *Asava–Arishta* are more than historical curiosities — they are pragmatic, scientifically plausible formulation platforms. Integrative research can bridge the time-tested wisdom of *Bhaishajya Kalpana* with contemporary pharmaceutics and therapeutics, enriching both traditions and patient care.

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