Asian Pac. J. Nursing and Health Sci., **2026; 9(1):35-46** **e-ISSN: 2581-7442**

DOI: https://doi.org/10.46811/apjnh/9.1.1

A Comprehensive Review on Churna: An Ayurvedic formulation

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Abstract

Churna, a classical Ayurvedic powdered formulation, has been widely used for centuries due to its simplicity, rapid absorption, and therapeutic efficacy. Prepared by finely grinding single or multiple medicinal herbs, Churna leverages the synergistic action of its ingredients, guided by Ayurvedic principles such as Rasa, Guna, Virya, Vipaka, and Prabhava. This review explores the historical background, classification, preparation techniques, and therapeutic significance of Churna, emphasizing its role in digestive health, metabolic regulation, immunomodulation, anti-inflammatory activity, and neuro protection. Recent scientific studies (2020–2025) validate these pharmacological activities, demonstrating the clinical relevance of classical formulations such as Triphala, Trikatu, and Chyawanprash. Despite its advantages, Churna faces challenges including variability in raw materials, microbial contamination, moisture-induced instability, dosing inconsistencies, and lack of globally harmonized quality standards. Modern analytical techniques, such as chromatographic fingerprinting, particle-size optimization, and stability testing, alongside advanced packaging solutions, offer strategies to improve quality, safety, and shelf-life. Integrating traditional Ayurvedic wisdom with contemporary pharmaceutical science can enhance standardization, patient compliance, and global acceptability. Overall, Churna represents a valuable phytotherapeutic option, and continued research can bridge classical knowledge with modern healthcare, promoting its safe and effective use in integrative medicine.

Keywords: Churnas, Ayurvedic formulation, Therapeutic action, Efficacious, Guna, Trikatu.

Introduction

Churna is one of the oldest and most fundamental dosage forms used in Ayurveda, traditionally defined as a fine,sieved herbal powder prepared from single or multiple medicinal plants. Classical Ayurvedic texts such as the Charaka Samhita and Sushruta Samhita describe Churna as a formulation created by drying, powdering, and blending herbs to achieve therapeutic effects based on the principles of Dosha balance.[1] Due to its simple preparation, rapid absorption, and ease of digestion, Churna remains one of the most widely prescribed formulations in Ayurvedic practice. In modern phytotherapy, Churna holds growing significance because powdered herbal forms preserve heat-sensitive phytoconstituents, ensure faster gastric dissolution, and allow flexible dose adjustments. Many commonly used Ayurvedic formulations—such as Triphala Churna, Hingwashtak Churna, Brahmi Churna, and Sitopaladi Churna—exhibit pharmacological activities including antioxidant, anti-inflammatory, digestive, immunomodulatory, and neurocognitive effects. [2,3]Scientific advancements over the last decade have led to increased interest in validating Churna formulations through phytochemical profiling, chromatographic standardization, and pharmacological studies. Research suggests that the therapeutic potential of Churna lies in the synergistic action of multiple herbs and their ability to enhance bioavailability when administere in powder form.[4] As a result, Churna continues to play a critical role in integrative medicine and natural product–based drug development.

Fig. 1:Triphala churna

Historical Background

Churna, as a traditional Ayurvedic formulation, has its origins in the ancient Indian medicinal system that dates back over 3,000 years. Classical Ayurvedic texts, including the CharakaSamhita and SushrutaSamhita, describe Churna as a therapeutic powder obtained from drying, grinding, and blending herbs in precise proportions to balance the three Doshas—Vata, Pitta, and Kapha.[1] These texts emphasize the importance of particle size, proper sieving, and combination of compatible herbsto ensure optimal therapeutic outcomes.

Historically, Churnas were developed as a convenient dosage form for rapid absorption and ease of administration**,** especially in situations where decoctions or paste preparations were difficult to use. The powdered form allowed practitioners to preserve heat-sensitive phytochemicals, enhance shelf life, and provide personalized dosing according to an individual's constitution.[5] Early formulations like Triphala Churna, Hingwashtak Churna, and Sitopaladi Churna were widely used for digestive, respiratory, and immunomodulatory purposes, highlighting the versatility and significance of Churna in classical practice**.**With the evolution of Ayurvedic practice over centuries, the preparation and use of Churna expanded beyond traditional households into institutionalized medicine. Modern research indicates that these historical formulations maintain synergistic pharmacological effects, where the combination of multiple herbs provides enhanced therapeutic action compared to single- ingredient powders.[6] Thus, the historical legacy of Churna continues to inform contemporary applications in both traditional and integrative medicine.

Importance of Churna in Ayurveda

Churna holds a central place in Ayurvedic therapeuticsdue to its simplicity, versatility, and effectiveness. One of its main advantages is its ease of administration; being a powdered form, Churna can be consumed directly, mixed with water, honey, or other carriers, making it suitable for patients of all ages. Classical Ayurvedic texts emphasize that Churna facilitates quick digestion (Ajeevana) and absorption (Bheshajyogya Guna), thereby accelerating therapeutic effects.[1]

Another key aspect of Churna is its ability to balance the three Doshas—Vata, Pitta, and Kapha. By combining multiple herbs with complementary properties, Ayurvedic practitioners create formulations that are holistically effective, targeting multiple physiological systems

simultaneously.[2] For example, Triphala Churna is widely recognized for its digestive, detoxifying, and immunomodulatory properties, reflecting the integrative approach of Ayurveda.

In addition to therapeutic effectiveness, Churna allows for flexible dosing and personalization. The powder form enables clinicians to adjust doses based on an individual's age, constitution (Prakriti), and severity of disease. Modern research also highlights that Churna formulations preserve active phytoconstituents better than other dosage forms like decoctions or pills, ensuring sustained pharmacological activity.[4]Overall, the importance of Churna in Ayurveda lies in its therapeutic versatility, rapid bioavailability, ease of use, and ability to synergistically combine multiple herbs, making it an enduring and widely prescribed formulation in traditional and contemporary practice.

Modern Relevance of Churna

Churna in ancient Ayurvedic practice, has gained significant attention in modern phytotherapy and integrative medicine due to its therapeutic versatility, ease of use, and scientifically validated pharmacological effects.

- **Complementary Medicine**: Churna formulations are increasingly used alongside conventional therapies to improve outcomes, reduce side effects, and enhance overall well-being.[3]
- **Natural and Biocompatible**: Being plant-based, Churna offers a safer, natural alternative for long-term management of chronic diseases.
- **Synergistic Action**: Multi-herb powders provide synergistic effects, improving efficacy compared to single-herb preparations.
- **Flexible Dosage Forms**: Churna can be administered orally, mixed with water, honey, or ghee, making it compatible with modern personalized medicine approaches.
- **Ease of Standardization**: Advances in analytical techniques allow chemical profiling and quality control, enabling Churna's integration into evidence-based practice.

Scientific Validation of Pharmacological Effects

- **Antioxidant and Immunomodulatory**: TriphalaChurna has been shown to scavenge free radicals, reduce oxidative stress, and enhance immune function.[2]
- **Anti-inflammatory and Gastroprotective**: Sitopaladi Churna demonstrated anti-inflammatory effects in preclinical studies, supporting its use in respiratory and digestive disorders.[4]
- **Neuroprotective Effects**: Brahmi Churna is validated for cognitive enhancement and neuroprotection in animal and clinical studies.[5]
- **Metabolic Regulation**: Certain Churnas have been studied for their hypoglycemic, lipid-lowering, and hepatoprotective activities, reflecting potential applications in metabolic disorders.[3]
- **Integration in Modern Formulations**: Standardized Churnas are now used in nutraceuticals and dietary supplements, bridging traditional medicine with contemporary healthcare.

Therapeutic Significance

- **Neuroprotective:**TriphalaChurna improves nerve function, reduces inflammatory cytokines, and supports nerve regeneration in diabetic neuropathy. [7]
- **Antioxidant & Antimicrobial:**Churnas like Triphala and Vidangadi exhibit strong free-radical scavenging and inhibit pathogenic bacteria.[8]
- **Metabolic Regulation:** Trikatu Churna supports digestion, lipid metabolism, and glycemic control.[9]
- **Pediatric& General Use:** Bala Chaturbhadra Churna is safe and effective for children; Sudarshan Churna aids fever and infection management.[10,11]
- **Endocrine & Gut Health:**VidangaChurna with Kulattha Yusha shows potential in hypothyroidism; Triphala modulates gut microbiome and digestive health.[12,13]
- **Standardization & Quality:** HPTLC and physico-chemical studies ensure consistency and reliable therapeutic outcomes.[11]

2. Principles of Churna in Ayurveda

- **Selection of Ingredients (DravyaChayan):** Herbs are chosen based on their Rasa (taste), Guna (quality), Virya (potency), Vipaka (post-digestive effect), and Prabhava (specific action) to ensure a synergistic effect in the final formulation.
- **Proportion and Combination (Yogavidhana):** Classical texts describe precise ratios to combine herbs, ensuring dosha-specificaction and therapeutic efficacy.
- **Particle Size and Finishing (Sukshmata):**

Herbs are powdered finely and sieved to obtain uniform particle size, enhancing surface area, dissolution, and absorption.

- **Purity and Preservation (Shuddhi & Samshodhana):** Ingredients are cleaned, dried, and processed to remove contaminants, moisture, and microbial load, ensuring safety and stability[9,10].
- **Personalized Administration (Matra & Kala):** Dosage, timing, and anupana (vehicle likehoney, ghee, or water) are tailored to the patient's constitution, age, and disease severity.

3. Classification of Churna in Ayurveda

Churna are classified based on composition, therapeutic use, and method of preparation,particle size and Dose/ Administration [11,12]

Table No.1: Classifications of Churnas

Sr. No.	**Basis of classification**	**Type and subcategory**	**Description / Examples**
1.	Number of Ingredients	Single-drug Churna (Eka Dravya)	Made from one herb or mineral. Example:Haritaki Churna
		Multi-drug Churna (Bahya Dravya)	Combination of multiple herbs for synergistic effect. Example: Triphala Churna (Amla, Haritaki, Bellerica)
2.	Therapeutic Action	Rasayana Churna	Rejuvenation, immunity, longevity (e.g., Chyawanprash powder)
		Lekhana Churna	Reduces fat, regulates metabolism
		Deepana-Pachana Churna	Enhances digestion and appetite
		Dosha-specific Churna	Balances Vata-Kapha or Pitta-Kapha
3.	Method of Preparation	Classical Churna	Prepared according to Ayurvedic texts with precise proportions
		Formulated Churna	Standardized for modern usage: quality, purity, potency
4.	Consistency / Particle Size	Sukshma Churna	Very fine powder for rapid absorption
		Madhyama Churna	Medium-grain powder for gradual release
		Sthula Churna	Coarse powder, often for external use
5.	Dosage / Administration	Oral Churna	Consumed with water, honey, or ghee
		External Churna	Applied externally (e.g., Udvartana)

Fig. 2: Haritaki churna

Fig. 3: Triphala churn

(Single drug churna)(Multi drug churna)

Fig. 4: Rasayana churna

Fig. 5: Kapha churna for specific dosh

Raw Materials Used in Churna Preparation[13]

Medicinal Plant Part

- Churna is primarily prepared from authenticated herbal raw materials such asroots, rhizomes, leaves, fruits, seeds, bark, and whole plants.
- Example: Haritaki fruit, Guduchi stem, Ashwagandha root.
- Proper identification, drying, and selection of mature plant parts ensure potency.

Mineral and Herbo-Mineral Substances

- Classical formulations incorporate purified minerals such as Shunthi Churna with Yashada Bhasma or Trikatu with processed salts.
- These are used only after purification (Shodhana) to ensure safety.

Spices and Culinary Herbs

- Common spices such as ginger, pepper, cinnamon, cumin, fennel, and coriandererare frequently used due to their carminative, digestive, and antioxidant properties.
- These enhance bioavailability and therapeutic effects.

Adjuvants (Anupana)

- Substances like honey, ghee, warm water, or milk are not part of the powder but are used as vehicles during administration to enhance absorption.
- They modify pharmacokinetics and therapeutic specificity[14].

4.2 Natural Preservatives

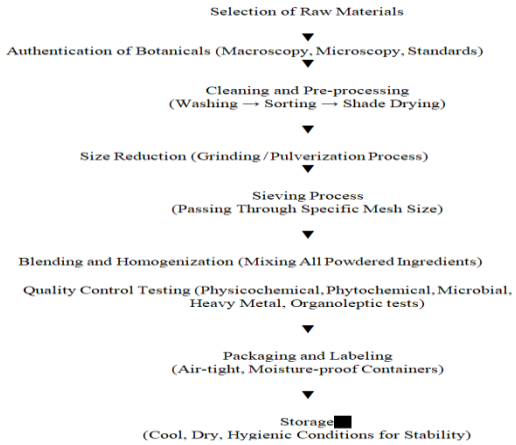
- Since Churnas are dry powders, no synthetic preservatives are added traditionally.
- Some modern formulations use natural stabilizers like clove powder or turmeric to improve shelf stability.

4.3 Quality-Control Raw Materials

- Modern Ayurvedic industries include standard reference markers, authenticated plant powders, and pharmacopeial-grade excipients to maintain quality, particle size, and flowability[15].
  - These ensure uniformity and reproducibility in large-scale manufacturing.

Preparation Technique

Churana preparation Process[16]



Traditional Methods for Churna Preparation[17]

- **Selection of Medicinal Herbs -**Traditional practitioners select herbs based on classical Ayurvedic texts such as CharakaSamhita and SushrutaSamhita.Selection depends on Rasa, Guna, Virya, Vipaka, and Prabhavafor therapeutic alignment[18].
- **Collection and Purification (Shodhana) -**Raw herbs are collected during specific seasons when their potency is highest. Purification procedures (washing, soaking in herbal decoctions, drying) remove impurities and enhance efficacy.
- **Shade Drying (Chhaya Shoshana) -** Plant materials are dried under shade to preserve volatile oils, heat-sensitive phytochemicals, and aroma. Sun-drying is avoided unless specifically mentioned in classical guidelines[19].
- **Traditional Grinding Methods -**Herbs are ground using stone mortar and pestle (Khalva Yantra)orhand mills (Chakki). Slow, manual grinding helps:Maintain natural heat levels,Preserve volatile constituents,Achieve fine particle size without thermal degradation[20].
- **Sieving Through Cloth or Mesh -**Traditionally, powders are filtered through muslin cloth (Vastra Chalan)or hand-woven sieves. This ensures:Uniform particle size,Smooth texture,Better mixing properties.
- **Blending of Ingredients (Mishran Karma) -** Individual herbal powders are mixed thoroughly by hand in a clockwise and anticlockwise pattern, following ritual practices. Ensures uniform distribution of herbs and enhances samskara (processing quality)[21].
- **Use of Traditional Adjuvants (Anupana) -** Churna is consumed with natural adjuvants such as:Honey (Madhu),Ghee (Ghrita),Warm water,Milk. Adjuvants enhance absorption, palatability, and therapeutic targeting.
- **Storage in Indigenous Containers -** Powders are traditionally stored in: Earthen pots,Bamboo boxes,Cloth pouches. These natural materials maintain dryness and prevent moisture accumulation[22].

Standardization Parameters for Churna Formulations[23]

Table No.2: Standardization Parameters for Churna Formulations

	Standardization Parameter	Evaluation	Purpose
1.	Organoleptic Evaluation	Assessment of color, odor, taste, texture, and appearance.	Ensures batch-to-batch consistency and preliminary quality check.
2.	Physicochemical Parameters	Loss on drying, ash values (total, acid-insoluble), extractive values, bulk density, tap density, pH, particle size.	Determines purity, stability, moisture content, and powder characteristics.
3.	Phytochemical Screening	Qualitative and quantitative estimation of secondary metabolites like alkaloids, flavonoids, tannins, saponins, terpenoids. Marker analysis using HPLC/UV.	Confirms presence and concentration of bioactive compounds.
4.	Microbial Load Testing	Total aerobic microbial count, total fungal count, absence of pathogens (E. coli, Salmonella, Staphylococcus aureus).	Ensures safety, hygiene, and compliance with pharmacopeial limits.
5.	Heavy Metal Analysis	Determination of lead, arsenic, mercury, cadmium using ICP-MS or AAS.	Ensures safety by verifying absence of toxic metals.

6.	Foreign Matter & Adulteration Check	Removal of soil, stones, fibers, insects, and extraneous plant parts.	Confirms purity and authenticity of raw materials.
7.	Volatile Oil Content (if applicable)	Measurement of essential oils in aromatic herbs (e.g., mint, fennel).	Maintains potency in formulations containing aromatic plants.
8.	Moisture Content	Determined by loss on drying.	Prevents microbial contamination and enhances shelf-life.
9.	Flow Properties	Angle of repose, Carr's index, Hausner ratio.	Important for mixing, handling, and uniform dosing.
10.	Stability Testing	Conducted under accelerated conditions of temperature and humidity.	Determines the shelf-life and storage requirements.

7. Therapeutic Applications of churna[25]

7.1 Digestive and Metabolic Disorders

- TrikatuChurna (combination of black pepper, long pepper, and ginger) enhances digestion, metabolism, and appetite.
- Triphala Churna is used to regulate bowel movements, improve gut microbiota, and act as a mild laxative.

7.2 Immunomodulatory and Rejuvenating Effects

- Rasayana Churnas like Chyawanprash powder and Amalaki-based Churna improve immunity, energy, and overall vitality.
- Regular intake helps in combating oxidative stress and supports longevity.

7.3 Anti-inflammatory and Analgesic Effects

- Churnas containing Vidanga, Haritaki, and Guduchidemonstrate anti-inflammatory, antioxidant, and analgesic activity in preclinical studies.
- Beneficial for arthritis, joint pain, and inflammatory disorders.

8Safety, Stability, and Storage Considerations

7.4 Antimicrobial and Antiviral Actions

- Certain Churnas, such as Trikatu and Triphala, show broad-spectrum antimicrobial activity against bacterial and fungal pathogens.
- They are useful in preventing respiratory and gastrointestinal infections.

7.5 Metabolic Syndrome and Endocrine Disorders

- Formulations like Trikatu Churna and Vidanga Churnaare used in obesity, hyperlipidemia, and diabetes management**.**
- They help regulate blood sugar, lipid profile, and body weight.

7.6 Pediatric and General Health

- Bala Chaturbhadra Churna is commonly used for enhancing immunity, growth, and strength in children.
- Mild, palatable, and safe when administered
- in proper doses.

7.7 Neuroprotective and Cognitive Support

- Some formulations like Triphala Churna show neuroprotective properties, reducing oxidative stress in neuronal cells and supporting cognitive function.

Table No.3: Safety, Stability, and Storage Considerations

Sr. No.	Parameter	Values
1.	**Safety**	Safe when prepared from authenticated herbs and administered in classical doses. Mild gastrointestinal discomfort may occur if overdosed. Heavy metals and microbial contamination must be absent (below pharmacopeial limits).
2.	**Moisture Content**	Ideally ≤8–10**%**, to prevent microbial growth and caking
3.	**Particle Size**	Fine powder: 80–120 mesh recommended for uniformity and faster absorption.
4.	**pH**	Neutral to slightly acidic: 5.5–6.8depending on the formulation.
5.	**Microbial Load**	Total aerobic count: $\leq 10^3$ CFU/g, fungi: $\leq 10^2$ CFU/g, absence of pathogens (E. coli,Salmonella, S. aureus).
6.	**Heavy Metals**	Lead, arsenic, mercury, cadmium: below permissible limits (WHO/AYUSH standards).
7.	**Shelf-life / Stability**	Typically 6–24 months depending on ingredients and storage. Accelerated stability testing ensures potency over shelf-life.
8.	**Storage Conditions**	Airtight, moisture-proof containers; cool (20– 25°C), dry, and dark place. Avoid sunlight and high humidity. Traditional storage: earthen pots or bamboo boxes

Challenges and Limitations in Churna

- **Lack of Standardization** - Variation in particle size, raw material quality, and grinding technique leads to inconsistent therapeutic effect.[24]
- **Microbial Contamination Risk** -Powdered herbs are highly prone to microbial growth (fungi, bacteria), especially in humid conditions.[25]
- **Moisture Absorption and Reduced Stability** - Being hygroscopic, churna absorbs moisture, causing caking, loss of flowability, and reduced shelf-life.[26]
- **Lack of Physicochemical Characterization** - Many churnas lack data on pH, ash values, moisture content, and phytochemical markers.[22]
- **Difficulty in Dose Uniformity** - Fine powders may not distribute evenly, leading to dosing errors and variable patient response.[27]
- **Poor Palatability** - Bitter and strong-tasting herbal powders lower patient compliance, especially in long-term therapy.[29,28]
- **Physical Instability (Caking, Lumping)** - Improper storage causes agglomeration, affecting mixing, packaging, and dose measurement.[29]
- **Adulteration and Substitution** -Low-quality, incorrect, or substituted herbs may be used due to limited raw material availability.[30]

Conclusion

Churna remains one of the most enduring and widely used Ayurvedic dosage forms, emphasizing the therapeutic strength of finely powdered herbal ingredients. Its simplicity, ease of administration, rapid absorption, and ability to deliver multi-herb synergistic effects make it highly relevant even in modern clinical practice. Over time, increasing scientific validation has supported the pharmacological potential of Churna formulations, demonstrating activities such as antioxidant,anti-inflammatory,digestive, antihyperglycemic, and immunomodulatory effects. Despite its growing acceptance, several challenges persist—including variability in raw materials, lack of standardized particle size, contamination risks, and the absence of globally harmonized quality benchmarks. These limitations highlight the need for advanced

standardization tools, including chromatographic profiling, microbial evaluation, and stability studies. Future advancements in particle engineering, packaging technologies, and evidence-based clinical trials can significantly enhance the reliability and global perception of Churna. Integrating traditional Ayurvedic principles with modern pharmaceutical sciences will be essential to developing formulations that are safe, consistent, and therapeutically effective. Overall, Churna holds considerable potential as an accessible, natural, and holistic therapeutic option, and continuous research will help strengthen its position within integrative and modern healthcare systems.

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Source of Support: Nil
Conflict of Interest: Nil