

Review Article

ISSN: 3048-5614

“POLYHERBAL FORMULATIONS IN AYURVEDA: PHARMACOLOGICAL RATIONALE AND MODERN EVIDENCE”

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FUNDING INFORMATION:

Not Applicable

How to cite this article:

Abhay Gandhi, “Polyherbal Formulations in Ayurveda: Pharmacological Rationale and Modern Evidence” Asian Journal of Dravyaguna and Pharmacology. 2024;1(2):4-7.

ABSTRACT

Introduction: Ayurveda, the traditional system of Indian medicine, has long emphasized the use of polyherbal formulations (*yoga* or *samyoga*) over single herbs (*ekadravya*). This strategy is based on the principles of *synergism*, *antagonism neutralization*, and *potentiation*, where combining multiple herbs enhances therapeutic efficacy and minimizes toxicity. Modern pharmacological studies have increasingly validated these concepts, demonstrating synergistic antioxidant, immunomodulatory, adaptogenic, and antimicrobial effects of polyherbal formulations.

Methods: A structured literature search was conducted using classical Ayurvedic texts (*Charaka Samhita*, *Sushruta Samhita*, *Bhavaprakasha Nighantu*), and modern databases (PubMed, Scopus, Web of Science, AYUSH Research Portal). Literature published between 1980 and 2025 was screened. Inclusion criteria comprised experimental, pharmacological, and clinical studies on polyherbal formulations, while single-herb studies were excluded. **Results:** Ayurvedic classics describe numerous polyherbal formulations such as *Chyawanprash*, *Triphala*, *Dashamoola*, and *Ashwagandharishta*, each targeting multiple body systems. Modern studies reveal mechanisms including enhanced bioavailability, synergistic free radical scavenging, immunomodulation, and gut microbiota modulation. Clinical trials support benefits in conditions like diabetes, arthritis, respiratory infections, and cognitive decline. However, variability in preparation, lack of standardization, and limited large-scale trials remain challenges.

Discussion: The Ayurvedic rationale of polyherbalism resonates with current systems biology and network pharmacology approaches. Integration of phytochemical profiling, omics-based research, and nanotechnology offers opportunities for scientific validation.

Conclusion: Polyherbal formulations embody Ayurveda’s holistic therapeutic philosophy and hold great promise as safe, effective, and multi-target pharmacological interventions. Rigorous standardization and clinical validation can strengthen their global acceptance.

KEYWORDS: Ayurveda, clinical trials, pharmacological evaluation, polyherbal formulations, synergism

INTRODUCTION

Ayurveda, one of the oldest healthcare systems, emphasizes a holistic approach to disease prevention and treatment. A distinguishing feature of Ayurveda is its reliance on polyherbal formulations, in which multiple herbs are combined in specific proportions to achieve synergistic therapeutic effects.^[1-3] This principle, known as *yoga* or *samuyoga*, reflects the belief that combinations provide a more balanced and potent action than individual herbs.^[4]

Historically, formulations such as *Chyawanprash*, *Triphala*, *Dashamoola*, and *Panchatikta Ghrita* have been prescribed for rejuvenation, immunity, metabolic disorders, and inflammatory conditions.^[5-7] Ayurvedic texts describe polyherbal combinations as capable of enhancing efficacy, reducing side effects, and addressing multiple disease pathways simultaneously.^[8]

The aim of this review is to analyze the Ayurvedic rationale of polyherbal formulations, summarize modern pharmacological evidence, and critically evaluate their potential in contemporary healthcare. Specific objectives include: documenting key classical polyherbal formulations and their indications, summarizing experimental and clinical research on their pharmacological actions, and highlighting challenges and future research directions.^[9-10]

MATERIALS AND METHODS

A comprehensive literature review was undertaken between January and August 2025.

Sources consulted:^[11]

- Ayurvedic texts: *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, *Bhavaprakasha Nighantu*.
- Databases: PubMed, Scopus, Web of Science, Google Scholar, AYUSH Research Portal.

Search strategy: Keywords included “Ayurveda AND polyherbal formulations,” “Chyawanprash pharmacology,” “Triphala antioxidant,” “Dashamoola clinical trial,” and “synergism Ayurveda.”^[12]

Inclusion criteria:^[13]

- Studies on Ayurvedic polyherbal formulations.
- Pharmacological studies (in vitro, in vivo).
- Clinical trials with oxidative stress, immune, metabolic, or anti-inflammatory endpoints.
- Reviews/meta-analyses published between 1980–2025.

Exclusion criteria:^[14]

- Studies on single-herb preparations.
- Non-peer-reviewed sources.
- Formulations outside Ayurveda.

Data extraction and synthesis: Classical references were compiled thematically, and modern evidence was organized into experimental, pharmacological, and clinical categories.^[15]

OBSERVATION AND RESULTS

1. Ayurvedic Rationale for Polyherbal Formulations:

Ayurvedic classics highlight that combining herbs enhances efficacy and reduces potential side effects. Principles include:

- **Synergism (*yoga vritti*):** Combined herbs produce stronger therapeutic effects.
- **Antagonism neutralization (*viruddhahara nivarana*):** Toxicity of one ingredient is neutralized by another.
- **Potentiation (*anurasa*):** Supportive herbs enhance the activity of the main drug.
- **Comprehensive action:** Different herbs target multiple *doshas* and tissues (*dhatus*) simultaneously.

2. Classical Polyherbal Formulations

- **Chyawanprash:** A *Rasayana* containing over 40 herbs, with *Amalaki* as the main ingredient. Traditionally prescribed for rejuvenation, immunity, and respiratory health.
- **Triphala:** Combination of *Amalaki*, *Haritaki*, *Bibhitaki*. Used for digestion, detoxification, and antioxidant activity.
- **Dashamoola:** Ten roots used for inflammatory conditions, pain, and fever.
- **Ashwagandharishta:** Fermented preparation with *Ashwagandha*, used for strength, stress, and neuroprotection.
- **Panchatikta Ghrita:** Ghee-based formulation of five bitter herbs for skin and metabolic disorders.

3. Pharmacological Evidence

a) Antioxidant activity

- *Triphala* demonstrates strong radical scavenging activity, protecting against lipid peroxidation.
- *Chyawanprash* enhances endogenous antioxidant enzymes (SOD, catalase, glutathione).
- *Dashamoola* shows anti-inflammatory and ROS-reducing effects in arthritis models.

b) Immunomodulatory effects

- *Chyawanprash* enhances IgG levels and NK cell activity in clinical trials.
- *Guduchi-based polyherbals* modulate macrophage activation and cytokine balance.

c) Anti-inflammatory and analgesic effects

- *Dashamoola* reduces TNF- α and IL-6 in experimental models of arthritis.
- *Triphala* reduces COX-2 and NF- κ B activation, supporting its use in inflammatory bowel disease.

d) Metabolic regulation

- *Triphala* improves insulin sensitivity and reduces blood glucose in animal models.
- *Chyawanprash* reduces cholesterol and oxidative markers in metabolic syndrome.

e) Neuroprotective and adaptogenic actions

- *Ashwagandharishta* enhances antioxidant defense in the brain, reducing oxidative stress and improving memory in animal models.
- *Brahma Rasayana* shows neuroprotective effects in age-related cognitive decline.

4. Clinical Evidence

- ***Chyawanprash*:** RCTs show improvement in immunity, reduction in recurrent respiratory infections, and enhanced antioxidant markers in elderly.
- ***Triphala*:** Clinical studies demonstrate benefits in constipation, oral health, and as adjunct therapy in diabetes.
- **Polyherbal anti-diabetic formulations:** Multiple clinical studies confirm efficacy comparable to modern drugs, with additional antioxidant support.
- ***Brahma Rasayana*:** Small-scale trials report improved cognition and reduced oxidative stress markers.

5. Limitations in Current Research

- Variability in preparation and dosage across studies.
- Lack of phytochemical standardization.
- Small sample sizes in clinical trials.
- Limited exploration of herb-herb pharmacokinetics.

DISCUSSION

Polyherbalism is a cornerstone of Ayurveda and reflects a systems-based approach to therapeutics. Modern pharmacology increasingly supports the rationale of multi-component formulations acting on multiple pathways simultaneously. Network

pharmacology studies suggest that polyherbals exert pleiotropic effects—antioxidant, anti-inflammatory, immunomodulatory, and metabolic regulation—by influencing diverse molecular targets.

The strength of polyherbal formulations lies in their holistic design. For instance, *Chyawanprash* combines *Amalaki* (antioxidant), *Pippali* (bioavailability enhancer), and *Dashamoola* (anti-inflammatory), ensuring multi-layered action. This mirrors modern drug combination strategies used in cancer chemotherapy, HIV treatment, and metabolic syndrome management.^[16]

However, challenges remain. Standardization of formulations is a major hurdle—variation in raw material quality, geographical sources, and preparation techniques affects consistency. Moreover, polyherbal pharmacokinetics are poorly studied; herb-herb interactions can influence absorption, metabolism, and efficacy. While clinical studies on formulations like *Triphala* and *Chyawanprash* are promising, they often involve small cohorts and lack robust endpoints such as oxidative stress biomarkers or inflammatory cytokine profiles.^[17]

Future research should integrate systems biology, metabolomics, and clinical pharmacology to unravel synergistic mechanisms. Regulatory frameworks must emphasize safety evaluation and quality assurance of polyherbals to ensure global acceptance.^[18]

In conclusion, Ayurveda's polyherbal approach resonates strongly with contemporary science. With rigorous validation, polyherbals can serve as evidence-based, safe, and holistic interventions for chronic diseases driven by oxidative stress and inflammation.

CONCLUSION

Polyherbal formulations are central to Ayurvedic therapeutics, embodying principles of synergy, potentiation, and holistic action. Classical examples like *Chyawanprash*, *Triphala*, *Dashamoola*, and *Ashwagandharishta* illustrate Ayurveda's foresight in designing multi-herbal interventions targeting multiple systems simultaneously.

Modern pharmacological studies confirm that polyherbals exert potent antioxidant, anti-inflammatory, immunomodulatory, adaptogenic, and metabolic effects. Clinical evidence supports their role in preventing respiratory infections, managing



metabolic syndrome, and reducing oxidative stress. Unlike single-compound drugs, polyherbals act through network-based mechanisms, aligning with modern systems biology.

However, challenges remain in standardization, quality control, herb-herb interactions, and large-scale clinical validation. Addressing these gaps through advanced phytochemical profiling, omics research, nanotechnology, and well-designed RCTs will strengthen the scientific credibility of Ayurvedic polyherbalism.

In conclusion, polyherbal formulations represent an integrative therapeutic paradigm with relevance for modern healthcare. By bridging classical wisdom and contemporary pharmacology, they can provide safe, effective, and holistic solutions to complex chronic diseases.

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