JOURNAL OF PHYTOPHARMACOLOGY AND PHYTOMEDICINE

P-ISSN: 3081-0620
E-ISSN: 3081-0639
JPP 2025; 2(1): 10-13
www.phytomedjournal.com
Received: 25-02-2025
Accepted: 28-03-2025

Kaelen
Professor, Institute of Integrative Medicine, School of Phytotherapy Research, Aurelius Medical College, Veyora City, Lumeris

Corresponding Author:
Kaelen
Professor, Institute of Integrative Medicine, School of Phytotherapy Research, Aurelius Medical College, Veyora City, Lumeris

Synergistic effects of polyherbal formulations in phytomedicine: A review of traditional and contemporary evidence

Kaelen

DOI: https://www.doi.org/10.33545/30810620.2025.v2.i1.A.8

Abstract
Polyherbal formulations, which involve the combination of multiple medicinal plants, have been a cornerstone of traditional medicine for centuries. These formulations are based on the principle of synergy, where the combined therapeutic effects of various phytochemicals enhance efficacy, bioavailability, and safety compared to single-plant extracts. This review critically examines both traditional and modern evidence on the synergistic effects of polyherbal formulations, particularly focusing on their phytochemical interactions, pharmacodynamic and pharmacokinetic complementarity, and therapeutic relevance in managing chronic diseases such as inflammatory disorders, metabolic syndromes, and neurodegenerative conditions. While traditional practices provide empirical validation, modern research underscores the need for robust standardization protocols, advanced omics-based analyses, and evidence-based clinical trials. The review concludes by emphasizing the potential of polyherbal formulations in bridging ethnomedicine with contemporary pharmacological approaches.

Keywords: Ethnomedicine, safety compared, traditional, contemporary evidence, phytomedicine

Introduction
Phytomedicine, defined as the therapeutic use of plant-derived bioactive compounds, has long been a foundational aspect of global healthcare. From Ayurvedic traditions in India to Traditional Chinese Medicine (TCM), Greco-Arabic Unani practices, and African ethnomedicine, societies have relied on botanical knowledge for managing acute and chronic health conditions. A defining feature of these systems is the use of polyherbal formulations, which combine multiple herbs in specific proportions to achieve synergistic therapeutic effects. The concept of synergy in polyherbal formulations enhances the therapeutic efficacy, bioavailability, and safety compared to single-plant remedies.

The principle of synergy posits that combining diverse bioactive compounds can simultaneously target multiple biological pathways. This approach is particularly beneficial for managing chronic diseases, where multiple pathological mechanisms such as oxidative stress, inflammation, and metabolic dysregulation converge. This review critically evaluates both traditional and modern perspectives on polyherbal formulations, with a focus on their application in managing complex chronic diseases.

Objective
The objective of this paper is to review and critically assess the synergistic effects of polyherbal formulations in phytomedicine, focusing on both traditional knowledge and contemporary scientific evidence. The paper aims to explore the therapeutic advantages of combining multiple medicinal plants in polyherbal formulations, particularly in managing chronic diseases such as inflammatory disorders, metabolic syndromes, and neurodegenerative conditions.

Traditional foundations of polyherbal formulations
Polyherbal formulations have been deeply embedded in traditional medicine systems. In Ayurveda, the classical texts Charaka Samhita and Sushruta Samhita describe numerous formulations that combine herbs for synergistic effects.

These formulations balance the rasa (taste), guna (properties), virya (potency), and vipaka (post-digestive effect) to promote overall wellness and address systemic imbalances.

Similarly, Traditional Chinese Medicine (TCM) employs a structured approach where herbs are categorized according to their roles in a formulation. The emperor herb provides the main therapeutic action, while the minister herbs enhance or support this effect, the assistant herbs mitigate toxicity, and the courier herbs facilitate the delivery of the formulation to targeted organs or systems.

In African ethnomedicine, polyherbal formulations are used for various purposes, including treating inflammatory conditions, infectious diseases, and metabolic disorders. For example, combinations like *Vernonia amygdalina*, *Ocimum gratissimum*, and *Azadirachta indica* are commonly used for fever and inflammation. These combinations are rooted in empirical knowledge passed down through generations.

Phytochemical Interactions in polyherbal formulations

One of the key advantages of polyherbal formulations lies in their ability to enhance the bioavailability and therapeutic efficacy of plant compounds. Phytochemicals in these formulations work synergistically to modulate multiple molecular pathways, which is essential for treating chronic, multifactorial diseases such as cancer, cardiovascular disease, and diabetes. The combined action of flavonoids, alkaloids, terpenoids, saponins, and phenolic acids enables polyherbal formulations to act on oxidative stress, inflammation, apoptosis, and lipid metabolism simultaneously.

A well-known example is the synergy between curcumin from *Curcuma longa* and catechins from *Camellia sinensis*. These compounds work together to suppress NF-κB signaling, a key inflammatory pathway involved in many chronic diseases. Piperine, found in *Piper nigrum*, is another key compound that enhances the bioavailability of curcumin by inhibiting glucuronidation in the liver, allowing higher concentrations of curcumin to remain in the system for longer periods.

Table 1: Phytochemicals in polyherbal formulations

Herb	Phytochemicals	Therapeutic Effects
Curcuma longa (Turmeric)	Curcumin, Demethoxycurcumin	Anti-inflammatory, antioxidant, anticancer
Camellia sinensis (Green Tea)	Catechins, EGCG	Antioxidant, anticancer, anti-inflammatory
Withania somnifera (Ashwagandha)	Withanolides, Sitoindosides	Adaptogenic, immunomodulatory, anti-stress
Zingiber officinale (Ginger)	Gingerols, Shogaols	Anti-inflammatory, digestive aid, antioxidant

Clinical evidence of polyherbal efficacy

Several clinical trials have demonstrated the efficacy of polyherbal formulations in treating chronic diseases. For instance, a polyherbal anti-diabetic formulation containing *Gymnema sylvestre*, *Momordica charantia*, and *Pterocarpus marsupium* has shown significant reductions in fasting glucose and HbA1c levels in type 2 diabetes patients. Similarly, Triphala has been shown to reduce body weight, waist circumference, and LDL cholesterol in overweight individuals, while Liu Wei Di Huang Wan demonstrated improvements in renal function and glycemic control in diabetic nephropathy patients.

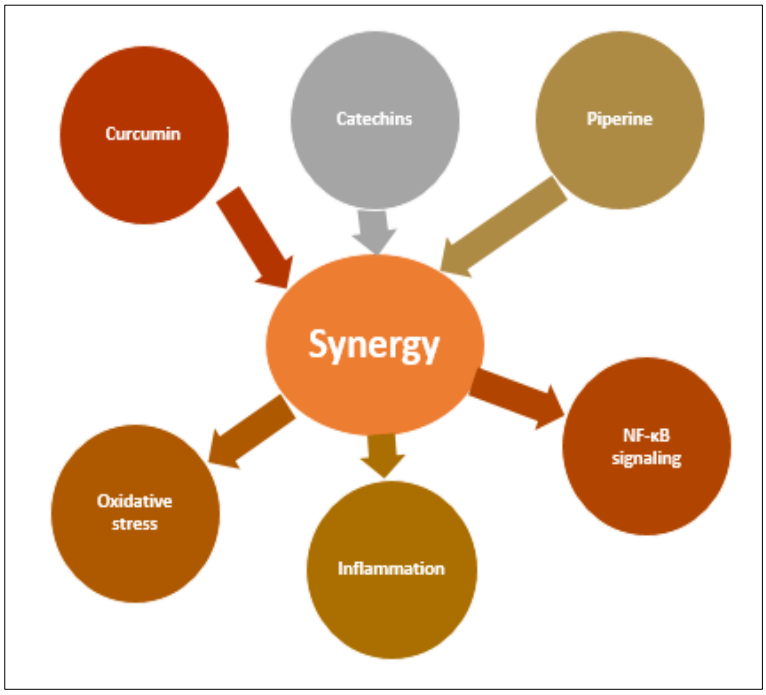

Fig 1: Synergistic mechanisms of polyherbal formulations

Challenges in Polyherbal Formulation Integration

Despite the promising evidence supporting polyherbal formulations, several challenges exist. Standardization of polyherbal preparations remains a major issue, as variations in plant sourcing, geographical location, and preparation methods can lead to inconsistent concentrations of active compounds. Moreover, the pharmacokinetic interactions between multiple phytochemicals can complicate efficacy

and safety assessments. Finally, the regulatory frameworks governing polyherbal formulations are often inadequate, as most regulatory bodies prioritize single-plant or single-molecule drugs.

Bioavailability enhancement and toxicity reduction

One of the major advantages of polyherbal formulations is the enhanced bioavailability of key phytochemicals. Many bioactive compounds, such as curcumin and catechins, suffer from poor absorption and rapid metabolism. However, when combined with complementary compounds like piperine, their bioavailability is significantly improved, resulting in greater therapeutic efficacy.

Furthermore, polyherbal formulations help mitigate toxicity. Many potent bioactive compounds can cause adverse effects when used alone, especially at high doses. However, polyherbals balance the effects by including herbs that have detoxifying or buffering properties, reducing the risk of adverse reactions while maintaining efficacy.

Table 2: Clinical outcomes of polyherbal formulations in chronic diseases

Polyherbal Formulation	Condition	Clinical Outcome
Gymnema sylvestre + *Momordica charantia* + *Pterocarpus marsupium*	Type 2 Diabetes	Reduced fasting glucose and HbA1c by 22% and 1.3%, respectively
Triphala	Obesity	Decreased BMI by 2.1 kg/m², reduced LDL levels
Liu Wei Di Huang Wan	Diabetic Nephropathy	Improved renal function, decreased HbA1c

Conclusion

Polyherbal formulations represent a promising and effective approach in the field of phytomedicine, offering a multifaceted strategy for the treatment of chronic diseases. By leveraging the synergistic interactions of multiple medicinal plants, these formulations provide enhanced therapeutic efficacy, improved bioavailability, and reduced toxicity compared to single-herb preparations. The review of both traditional and contemporary evidence highlights the significance of polyherbal formulations in managing complex diseases such as inflammatory disorders, metabolic syndromes, and neurodegenerative conditions.

Traditional medicine systems, including Ayurveda, Traditional Chinese Medicine (TCM), and African ethnomedicine, have long validated the therapeutic potential of polyherbals. These formulations, grounded in centuries of empirical knowledge, offer broad-spectrum therapeutic effects, addressing various pathological processes simultaneously. Modern scientific research has begun to substantiate the efficacy of these formulations, focusing on their antioxidant, anti-inflammatory and immunomodulatory properties. Moreover, the mechanisms of synergy among the bioactive compounds in polyherbal formulations are increasingly supported by contemporary pharmacological studies.

Despite the promising potential, challenges remain in the integration of polyherbal formulations into mainstream medicine. Issues related to standardization, quality control, and reproducibility of phytochemical composition must be addressed to ensure consistency and reliability in clinical applications. Regulatory frameworks also need to evolve to accommodate the unique characteristics of polyherbal medicines, facilitating their acceptance in global healthcare systems. Future research should prioritize large-scale clinical trials, advanced omics-based analyses, and the development of standardized formulations to fully realize the potential of polyherbal formulations. Integrating pharmacogenomics, systems biology, and network pharmacology will provide a more precise understanding of the mechanisms of synergy, thereby enhancing the clinical application and efficacy of these formulations.

References

1. Patwardhan B, Vaidya ADB. Natural products drug discovery: Accelerating the clinical candidate development using reverse pharmacology approaches. Phytother Res. 2010;24(2):183-189.
2. Yuan H, Ma Q, Ye L, Piao G. The traditional medicine and modern medicine from natural products. Molecules. 2016;21(5):559.
3. Williamson EM. Synergy and other interactions in phytomedicines. Phytomedicine. 2001;8(5):401-409.
4. Peterson CT, Denniston K, Chopra D. Therapeutic uses of Triphala in Ayurvedic medicine. J Altern Complement Med. 2017;23(8):607-614.
5. Baliga MS. Triphala, Ayurvedic formulation for treating and preventing cancer: A review. J Altern Complement Med. 2010;16(12):1301-1308.
6. Wang J, Tong X, Li P, Cao H, Su W. Clinical observations on Liu Wei Di Huang Wan for diabetic nephropathy. J Tradit Chin Med. 2012;32(1):66-69.
7. Aggarwal BB, Shishodia S. Molecular targets of dietary agents for prevention and therapy of cancer. Biochem Pharmacol. 2006;71(10):1397-1421.
8. Wagner H. Synergy research: Approaching a new generation of phytopharmaceuticals. Fitoterapia. 2011;82(1):34-37.
9. Rastogi S, Pandey MM, Rawat AK. Traditional herbs: A remedy for cardiovascular disease. Phytomedicine. 2016;23(11):1082-1089.
10. Ekor M. The growing use of herbal medicines: Issues relating to adverse reactions and challenges in monitoring safety. Front Pharmacol. 2014;4:177.
11. Mukherjee PK, Bahadur S, Harwansh RK. Development of polyherbal formulations based on Ayurveda: Advances and future prospects. Phytother Res. 2017;31(4):514-26.
12. Jagetia GC. Radioprotective potential of Triphala. Phytomedicine. 2002;9(2):99-108.
13. Deshpande A, Irani S, Patil R, Kurian B. Clinical evaluation of Triphala mouthwash in the prevention of dental caries. J Indian Soc Periodontol. 2011;15(3):257-260.
14. Li S, Zhang B. Traditional Chinese medicine network pharmacology: Theory, methodology and application. Chin J Nat Med. 2013;11(2):110-120.
15. Aboyade OM, Styger G, Gibson D, Hughes G. An ethnobotanical survey of herbal remedies used in the management of inflammatory disorders in Africa. J Ethnopharmacol. 2014;158:92-99.

16. Oyebode O, Kandala NB, Chilton PJ, Lilford RJ. Use of traditional medicine in middle- and low-income countries: A systematic review. BMC Complement Altern Med. 2016;16:306.
17. Shoba G, Joy D, Joseph T, Majeed M, Rajendran R, Srinivas PS. Influence of piperine on the pharmacokinetics of curcumin in animals and human volunteers. Planta Med. 1998;64(4):353-6.
18. Singh V, Gupta R, Saxena A, Banerjee M. Clinical efficacy of a polyherbal formulation in patients with type 2 diabetes mellitus. Phytother Res. 2017;31(8):1213-1220.
19. Wu L, Chen W, Li S, Li W, Wu B. Bu Zhong Yi Qi Tang in cancer supportive care: Clinical outcomes and quality-of-life improvements. Integr Cancer Ther. 2016;15(4):424-434.
20. Tilburt JC, Kaptchuk TJ. Herbal medicine research and global health: An ethical analysis. Bull World Health Organ. 2008;86(8):594-599.