



E-ISSN: 2278-4136

P-ISSN: 2349-8234

<https://www.phytojournal.com>

JPP 2024; 13(1): 210-221

Received: 21-10-2023

Accepted: 30-11-2023

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## The advances in polyherbal formulation

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DOI: <https://doi.org/10.22271/phyto.2024.v13.i1c.14828>

**Abstract**

Ayurveda, a traditional medicinal system originating in India, is founded on the principle of averting needless misery and encouraging a long, healthy life. Its method entails restoring equilibrium by addressing the underlying cause of illnesses with natural components, while also advocating for a balanced lifestyle to stop imbalances from happening again. Herbal medicines, with a rich historical presence in various cultures such as Indian, Greek, Egyptian, and Chinese have all been used medicinally. The World Health Organization estimates that 80% of people on the planet mostly get their medical care from traditional medicines. Known as a significant hub for biodiversity, India is home to around 45,000 plant species, of which 15,000 are known to have medicinal properties. Communities in India utilize 7,000-7,500 plants for treating various ailments.

In Ayurveda, both individual and combinations of herbs, known as polyherbal formulations, are employed for treatment. The 'Sarangdhar Samhita' in Ayurvedic literature underscores the importance of polyherbalism in boosting therapeutic effectiveness. Recognizing that it's possible that specific plants' active phytochemical components are inadequate for desired therapeutic effects, Ayurveda emphasizes the synergistic benefits achieved by combining multiple herbs in specific ratios. This approach not only enhances therapeutic effects but also minimizes potential toxicity. Polyherbal formulations, as highlighted in Ayurvedic literature, leverage the concept of 'panchamahabhutas,' emphasizing the balance of five elemental forces in the body.

Furthermore, Ayurveda recognizes the holistic nature of health, addressing physical, mental, and spiritual well-being. The integration of polyherbalism aligns with Ayurvedic principles of personalized medicine, where formulations are tailored to an individual's unique constitution or dosha.

This review delves into the critical role of polyherbalism in Ayurveda, exploring its clinical significance and the intricate balance it seeks to achieve in promoting comprehensive well-being. Key terms such as Ayurveda, panchamahabhutas, and polyherbal formulation are pivotal in understanding the depth and breadth of this traditional medicinal system.

**Keywords:** Ayurveda, polyherbal formulation, pharmacological action

**Introduction****Overview of Ayurveda**

Ayurveda, known also as Ayurvedic Medicine, stands as a venerable medicinal system boasting a centuries-long history. Rooted in ancient Vedic knowledge, it has weathered the test of time and continues to be a prominent healing science. Originating in India several millennia ago, Ayurveda is aptly referred to as the "Mother of All Healing." This esteemed tradition is originating from the Sanskrit terms veda (science or knowledge) and ayur (life), collectively meaning "the science of life." Its fundamental objective is to cultivate harmony and equilibrium in every facet of existence, addressing not just the body but also the spirit and mind.

- **Holistic Approach:** Ayurveda adopts a holistic approach to healthcare, considering the interconnectedness of various aspects of life. It emphasizes the balance of the three doshas - Vata, Pitta, and Kapha - as vital for maintaining well-being [1].
- **Personalized Medicine:** One distinguishing feature of Ayurveda is its personalized approach to treatment. It recognizes that each individual is unique, and the therapeutic interventions are tailored to one's specific constitution (Prakriti) and imbalances (Vikriti) [2].
- **Natural Remedies:** Ayurvedic treatments often involve the use of natural remedies, including herbs, minerals, and dietary guidelines. This approach aligns with the belief that nature provides the necessary elements for healing [3].
- **Preventive Care:** Ayurveda places a strong emphasis on preventive healthcare. It provides guidelines for maintaining a healthy lifestyle, incorporating practices such as daily routines (Dinacharya) and seasonal regimens (Ritucharya) [4].

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- **Mind-Body Connection:** Recognizing the intricate connection between the mind and body, Ayurveda incorporates practices like meditation, yoga, and Pranayama (breath control) to promote mental well-being [5].
- **Longevity and Rejuvenation:** Ayurveda is not solely focused on treating diseases; it also aims at promoting longevity and rejuvenation. Rasayana therapies are designed to enhance vitality and slow down the aging process [6].
- **Integration with Spirituality:** Ayurveda acknowledges the spiritual dimension of health and wellness. It integrates spiritual practices, recognizing that a balanced and harmonious spirit contributes to overall well-being.

In essence, Ayurveda stands as a comprehensive system of medicine, offering a profound understanding of life and health that extends far beyond mere physical well-being. It is a holistic philosophy that embraces the intricate tapestry of existence, seeking to optimize the quality of life on all levels.

Within Ayurveda, the five elements, or panchamahabhutas, are Vayu (air), Teja (fire), Aap (water), Prithvi (earth), and Akasha (aether). These elements are thought to be the fundamental building blocks that shape both the macrocosm (the outside world) and the microcosm (humans). The Tridosha, or the three humors, are created when these elements unite in pairs. Vata governs movement of the body, Pitta oversees chemical reactions in the body, including metabolism and temperature, and Kapha manages development, protection, lubrication, and nutrition. These components and humors work together to determine an individual's Prakriti, or constitution, which affects their mental and physical qualities.

The basic idea is that when these three basic doshas are in harmonious balance, optimal health is attained. Conversely, any imbalance can lead to the onset of diseases. Drawing upon the interplay of the Panchamahabhutas and Tridosha, which determine a person's Prakriti, paving the way for a customized treatment plan tailored to their distinctive composition.

The fundamental ideas of Ayurveda centers around the prevention of unnecessary suffering and the pursuit of a prolonged and healthy life. In contrast to allopathic medicines that predominantly employ artificial compounds that are tailored to target receptors and mostly relieve symptoms, the Ayurvedic embraces a natural approach. It incorporates elements such as nutrition, minerals, herbs, spices, exercise, mental health, meditation, yoga, noises, fragrances, and mechano-procedures. The objective is not merely to alleviate symptoms but to address the disease's underlying cause by re-establishing equilibrium. Simultaneously, Ayurveda aims to cultivate a healthy lifestyle to deter the recurrence of imbalances. Ayurveda is often described as holistic because its objective is to harmonize and harmony between the soul, mind, and body, with the aim of preventing illnesses and fostering overall well-being, lifespan, vigor, and contentment.

### The Ayurveda history

The Atharva-veda, as a significant literary milestone in Indian Civilization, serves not only as a repository of Ayurvedic healing verses but also as a foundational source for understanding the intricate principles of life and health. Beyond its explicit discussions on disease and treatment, the Atharva-veda encapsulates a broader worldview that

integrates spiritual and metaphysical dimensions with the physical aspects of well-being [7].

- **Metaphysical Insights:** Atharva-veda goes beyond the physical aspects of health and disease, offering metaphysical insights into the nature of existence. It delves into the interconnectedness of the individual with the cosmos, emphasizing the holistic integration of body, mind, and spirit [8].
- **Holistic Lifestyle Guidelines:** Embedded within the verses of Atharva-veda are guidelines for a holistic lifestyle. The text provides insights into practices that extend beyond medicinal remedies, including dietary recommendations, mental well-being, and the incorporation of natural elements for overall balance.
- **Cosmic Harmony:** Atharva-veda reflects the ancient belief in the harmonious relationship between humans and the cosmos. The alignment of an individual with the natural elements is emphasized, with the understanding that disruptions in this harmony can lead to imbalances and ailments.
- **Preventive Health Practices:** The text not only discusses cures for various diseases but also emphasizes preventive health practices. Atharva-veda underscores the importance of maintaining equilibrium in the body and mind to prevent the onset of illnesses, aligning with the preventive principles inherent in Ayurveda.
- **Cultural and Historical Significance:** Beyond its medical contributions, Atharva-veda holds cultural and historical significance as a testament to the intellectual and spiritual pursuits of ancient Indian civilization. It provides a window into the societal values, philosophical outlook, and intellectual achievements of that era.
- **Transmission of Knowledge:** Atharva-veda plays a pivotal role in the transmission of knowledge, as it forms the foundation upon which subsequent Ayurvedic texts like Chakara Samhita and Sushruta Samhita were built. The continuity of knowledge from divine entities to sages and then to successive generations reflects the sacred and revered nature of Ayurveda's teachings.
- **Diversity in Treatment Modalities:** The variety of healing methods mentioned in Atharva-veda, such as charms, plant and animal remedies, and the utilization of natural forces, underscores the diverse and inclusive nature of early Ayurvedic practices. This diversity allows for a personalized approach to healing based on the specific needs of individuals [4].

### The Past of Herbal remedies

Since ancient times, herbal treatments have been used all throughout the world. With a well-documented history dating back to prehistoric periods. Since ancient times, Herbal remedies have been an integral part of many cultures' medicinal practices, including Chinese, Greek, Egyptian, and Indian civilizations [9]. African Americans and Native Americans communities also incorporated herbs into their therapeutic practices as an integral aspect of their cultural practices [10]. Within the Ayurvedic system of India, herbal remedies have been recognized as potent healing agents, documented in ancient texts like Vedas and Samhitas [11].

The landscape of herbal medicine underwent a significant shift in the early 19th century with the advent of chemical analysis methods [12]. Scientists began to extract and modify active compounds from herbs, marking a transition from the use of raw herbs to the development of synthetic

pharmaceuticals [13]. This period saw a decline in the utilization of herbal medicines

However, the subsequent rise of synthetic pharmaceuticals revealed drawbacks, including higher costs and the occurrence of undesirable side effects despite their potent pharmacological actions [14]. As a result, there has been a contemporary resurgence of interest in herbal drugs, derived directly from nature, with claims of greater safety. Table 1 illustrates a selection of extensively used synthetic drugs derived from plants, showcasing the ongoing interplay between traditional herbal remedies and modern pharmaceuticals [15].

### Ayurvedic herbals

Categorized by their material source, There are three categories for Ayurvedic medications main groups: mineral, plant, and animal. Among these, herbal formulations have garnered significant importance and are currently gaining increased global attention. This trend is evident in the notable

increase in the use of herbal formulations in the developed world, particularly in The USA and European nations during the previous few years. The World Health Organization (WHO) estimates that 80% of people on the planet still primarily receive their medical care from conventional practitioners.

The Indian subcontinent is widely acknowledged as one of the key mega biodiversity centers, boasting roughly 45, 000 plants species. This abundance of flora has solidified India's reputation as a reservoir of herbal resources throughout the history of humanity. Within the Indian territory, around 15, 000 medicinal plants have been documented, of which communities have utilized 7, 000-7, 500 herbs to cure different diseases. Ayurveda, a traditional system of medicine, incorporates approximately 700 types of plants in its medicinal practices. The utilization of these herbal resources is extensively documented in classic Ayurvedic books like Sushruta Samhita and Chakara Samhita [1].

Synthetic drug derived from plants

Function	Synthetic drugs	Plants derivation
Anti-dysentery	Aesculetin	<i>Fraxinus rhynchophylla</i> (Oleaceae)
Circulatory disorders	Ajmalicine/8-yohimbine	<i>Rauwolfia serpentine</i> (Apocynaceae)
Antimalarial	Artemisinin	<i>Artemisia annua</i> (asteraceae)
Anti-cholinergic	Atropine	<i>Atropabelladonna</i> (solanaceae)
Cardiac glycoside	Digitalis	<i>Digitalis purpurea</i> (plantaginaceae)
Sympathomimetic	Ephedrine	<i>Ephedra sinica</i> (ephedraceae)
Analgesic	Morphine	<i>Papaver somniferum</i> (papaveraceae)
Antitussive	Noscapine	<i>Papaver somniferum</i> (papaveraceae)
Analeptic	Picrotoxin	<i>Anamirta cocculus</i> (Menispermaceae)
Anti-hypertensive	Reserpine	<i>Rauwolfia serpentine</i> (Rauwolfioideae)
Anti-malarial	Quinine	<i>Cinchona ledgeriana</i> (Rubiaceae)
NSAID (aspirin precursor)	Salicylic acid	<i>Filipendula ulmaria</i> (Rosaceae)
Laxative	Sennosides	<i>Cassia angustifolia</i> (Fabaceae)
Anticancer	Vincristine	<i>Cantharthus rosues</i> (Periwinkle)
Leukoderma; vitiligo	Xanthotoxin	<i>Ammimajus</i> (apiaceae)
Antipyretic	Paracetamol	<i>Cinchona succirubra</i> (Rubiaceae)
Antibiotic	Penicillin	<i>Penicillium</i> species
Anti-inflammatory	Dexamethasone	<i>Dioscorea mexicana</i> (Dioscoreaceae)
Antiemetic	Ondansetron	<i>Zingiber officinale</i> (Zingiberaceae)
Antihistamine	loratadine	<i>Perilla frutescens</i> (lamiaceae)
Antifungal	Fluconazole	<i>Aspergillus</i> species
Antiviral	Acyclovir	<i>Rhizophora mangle</i> (Rhizophoraceae)
Antioxidant	Vitamin E	<i>Triticum aestivum</i> (Poaceae)

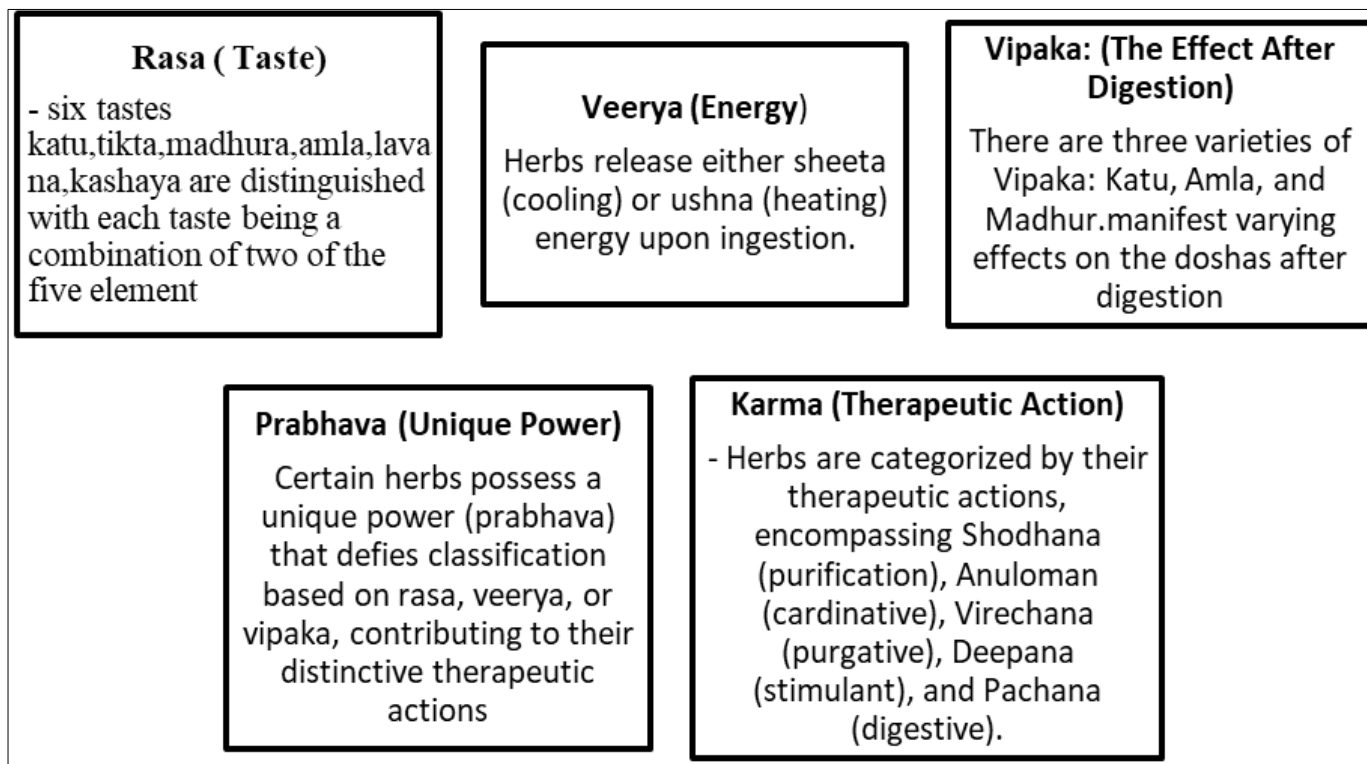
The exploration of herbal substances is enhanced by an understanding of the techniques for isolating, purifying, and characterizing active ingredients, as well as the techniques for getting ready. A "herbal drug" is a substance made from certain plant parts, such as leaves, flowers, seeds, roots, bark, stems, etc. utilized in the formulation of medicines. Various components of herbs are fully employed to achieve distinct pharmacological actions, resulting in a diverse array of Herbal preparations such as Taila (Medicated oil), Guggul (Resins and balsams), Kwatha (Decoction), Phanta (Hot infusion), Hima (Cold infusion), Arka (Liquid Extract), Churna (Powders), and more [16].

With today's scientific progress, the identification of pharmacologically active ingredients in Ayurvedic medicines and their therapeutic applications has become more extensive. The healing effects of herbs are primarily attributed to phytochemical constituents, including tannins, flavonoids, terpenoids, alkaloids, alkenyl phenols, sesquiterpene lactones, phorbol esters, and saponins. One herb could have as much as multiple phytochemical constituents, which collaborate

synergistically to produce pharmacological effects [17].

Several Ayurvedic herbs illustrate this concept. For instance, Saponin glycosides are present in (*Terminalia arjuna*). For enhancing the function of the heart muscle, while flavonoids provide antioxidant and vascular fortification effects. Ginger (*Zingiber officinale*) volatile oil includes sesquiterpenes (bisapolene, zingiberene, and zingiberol) and phenolic substances (shogaols and gingerols) [18]. Exhibiting sedative, antipyretic, analgesic, and bactericidal properties. Clove oil and cinnamon leaf oil, derived from *Syzygium aromaticum* and *Cinnamomum zeylanicum* respectively, possess antimicrobial properties due to their main constituent, eugenol. The three main phytoconstituents found in lemongrass (*Cymbopogon citrates*) essential oil are geranial, neral, and myrcene [19].

In the Ayurvedic tradition, herbal substances are esteemed for their multifaceted roles in regulating bodily functions, cleansing, and nourishing the human body [20]. Each herb is intricately classified based on five essential attributes:



Moreover, Ayurvedic herbal formulations are broadly categorized into two types: Rasaushadhies (herbo-bio-mineral metals) and Kasthoushadhies (pure herbal preparations). The latter incorporates minerals for their medicinal purposes effects, highlighting the holistic approach of Ayurveda in harnessing the synergies between diverse natural elements for promoting health and well-being [21].

#### Single herbal versus polyherbal formulation

Ayurvedic drug formulation adheres to two fundamental principles: employing a singular medicinal substance and utilizing a combination of multiple drugs, the latter referred to as PHF. This traditional herbal therapeutic approach relies on the amalgamation of various medicinal herbs to enhance therapeutic efficacy, commonly recognized such as polyherbalism or polypharmacy.

The historical Ayurvedic text, "Sarangdhar Samhita," dating back to the 14th century, has emphasized the idea behind polyherbalism within our antiquated healthcare system. In the conventional Indian medicine system, formulations often consist of combinations of botanical extracts rather than individual ones. Ayurvedic herbals are predominantly prepared as polyherbal formulations (PHFs) in various dosage forms.

While the specific plant's active phytochemical components are despite their established nature, they are frequently found in trace concentrations that might not be enough to produce the intended therapeutic benefits. Research studies have demonstrated that combining plants with varying potencies might perhaps yield superior results compared to their individual use or the sum of their effects. This positive interaction between herbs, known as synergism, becomes

evident when certain pharmacological actions are significant only in combination, not when used in isolation.

Examples of Ayurvedic herb combinations include the enhancement of heating and mucous-reducing effects by combining ginger combined with long and black pepper, or the positive offsetting of extreme effects by combining Combine bitter and chilly herbs with warming ones, such as ginger and neem. Traditional combinations like Asafoetida, cumin, and black pepper are used to lessen bloating brought on by poor digestion, while guduchi and turmeric together boost immunity.

Synergism operates through two mechanisms: pharmacokinetic synergism, focusing on the facilitation of the distribution, metabolism, excretion, and absorption of herbs as well as their pharmacodynamic synergism, studying the combined therapeutic effect because components that are active have comparable activities target the same physiological system or receptor.

Polyherbalism, due to synergism, offers benefits not attainable with single herbal formulations. It enables better therapeutic effects with lower doses, reducing the risk of adverse side effects. Polyherbal formulations also enhance patient comfort through eliminating the requirement to take multiple single herbal formulations simultaneously, leading to improved compliance and therapeutic effectiveness. Consequently, polyherbal formulations have gained popularity in the marketplace in contrast to their single herbal counterparts.

Several polyherbal formulations (PHFs) have undergone pharmacological and clinical investigations, confirming their desired therapeutic activities. Table provides examples of such PHFs

**Table 1:** Polyherbal formulations of Tablet

Name	Ingredient	Pharmacological action
Formulation of antidiabetic tablet for ODDS [22]	Pterocarpus marsupium, micro crystalline cellulose, Na-methyl paraben, starch	Treatment of diabetes mellitus
Fast dissolving tablet of curcumin, quercetin & rutin [23]	curcumin, quercetin, rutin SD complex, crospovidone, mannitol, lactose, magnesium stearate, tale, sodim saccharine	Anti-inflammation, anti-human immunodeficiency anticancer, antimutagenic
Polyherbal dispersible tablet [24]	<i>A. officinalis</i> , <i>B. diffusa</i> , <i>C. papaya</i> , <i>C. fistula</i> , <i>C. intybus</i> , <i>F. indica</i> , <i>F. hispida</i> , <i>C. nurvala</i> , <i>S. virgaurea</i> , <i>V. negundo</i>	Management of kidney disorders
Tablets for management of osteoporosis	<i>Nigella sativa</i> , <i>Gingiber officinale</i> , <i>Curcuma longa</i> , <i>Termania chebula</i> , kukkutatandavak bhasma, calcium phosphate dibasic, calcium carbonate, starch, Mg stearate, Gum acacia, net	Cure bone fracture, osteoporosis, calcium deficiency
Tablet by using neem, tulsi turmeric and ginger extract [25]	<i>Azadirachta indica</i> , <i>Ocimum tenuiflorum</i> , <i>Curcuma longa</i> , <i>Zingiber officinal</i>	Treatment of cold & cough
Sustain release formulation of herbal extracts [26]	Drug HPMCK4M, HPMCK15M, MCC, NaHCO <sub>3</sub> , Talc, Magnesium sterate	Release of drug in predetermind order
Polyherbal tablet containing indigenous medicinal plants [27]	<i>Boerhavia diffusa</i> , <i>Eclipta prostrata</i> , <i>Phyllanthus amarus</i> , <i>Solanum nigrum</i> , starch, Talc, Magnesium stereate, Acacia, Lactose	Treating liver problem
Antidiabetic tablet [28]	<i>T. portulacastrum</i> , <i>A. marmelos</i> , <i>Microcrystalline cellulose</i> , starch, crospovidone, magnesium sterate, talc	Cure hyperglycaemia
Tablet for pulmonary tuberculosis [29]	<i>Glycyrrhiza glabra</i> , <i>Piper longum</i> , <i>Curcuma longa</i> , <i>Adhatoda vasica</i> , mannitol, lactose, citric acid, flavour orange, magnesium stearate	Use to treat primary stage tuberculosis
Polyherbal antiulcer tablet	<i>Abrus precatorius</i> , <i>Cordia wallichii</i> , sodium hydrogen carbonate, talc, magnesium sterate	Antiulcer

**Table 2:** Polyherbal formulations of gels [30, 31, 3, 32, 33-37]

Name	Ingredient	Pharmacological action
Polyherbal Anti-acne face gel using Liquorice and Palash extract	Neem extract, Liquorice root extract, Orange peel extract, Palash flower extract, Carbopol 934, Triethanolamine, Glycerine, Honey, Rose water	Mild acne, topical therapy
gels for enhanced antibacterial efficacy in acne and skin disorders	Carbopol-940, Propylene glycol, Lauric acid, Potassium Sorbate, Isopropyl myristate, Propyl paraben, Methyl paraben, Triethanolamine, Tea Tree oil, Rubia Extract, Aloe Vera Gel,	Antibacterial
Ayurgreen Natura Pain Gel	Frankincense, Dried aloe vera, Myrrh, Magnesium silicate, Ferula asafoetida, Fuller's earth, Aloe vera	Anti-inflammatory, antioxidant and anti-cancerous activities
Anti-inflammatory topical polyherbal gel	<i>Berberis aristata</i> , <i>Boswellia serrata</i> , and <i>Rubia cordifolia</i> , <i>Rubia cordifolia</i> root	Fatty liver disease, endometriosis, diabetes mellitus, Inflammatory Bowel Disease (IBD), asthma, rheumatoid arthritis, obesity, Alzheimer's disease, Parkinson's disease, and cancer
Polyherbal Emulgel for Treatment of Acne	Turmeric extract, Lemon grass oil, Tea tree oil, Aloe Vera extract, Carbop ol 940, Liquid paraffin, Methyl paraben, Ethyl paraben	For the treatment of acne vulgaris
Polyherbal Gel Against Staphylococcus Aureus Bacteria Causing Skin Disease	<i>Murraya koeaniggi</i> , <i>Eucalyptus globulus</i> , <i>Dodonaea viscosa</i> and <i>Mentha spicata</i> , Honey, Triethanolamine, Propyl Paraben Sodium	Antimicrobial activity
Polyherbal topical gel for acne	<i>Alor barbadensis</i> , <i>Vigna radiate</i> , carbopol940, propylene glycol methyl paraben, triethanolamine	Treatment of acne, antimicrobial
Polyherbal hair gel formulation	Guava leaves extract, aloe extract, carbopol940, amla juice, propylene glycol, triethanolamine	It nourished the hair& prevent premature graying
Polyherbal gel containing extract of plants	<i>Azadirachta indica</i> , <i>Adhatoda vasica</i> , piper betle, <i>Ocimum tenuiflorum</i> , <i>Pongamia pinnata</i> , carbapol940, propylene glycol400, ethanol, methyl paraben, propyl paraben, EDTA, triethanolamine	Antimicrobial activity
Wound healing activity of polyherbal gel	<i>C. asiatica</i> leaves, <i>C. zeylanicum</i> steam bark, oil of <i>M. olifera</i> seed	Antibacterial activity

**Table 3:** Polyherbal formulations of Suspension: [38-47]

Name	Ingredient	Pharmacological action
Polyherbal Suspension Containing <i>Curcuma longa</i> , <i>Ocimum sanctum</i> and <i>Azadirachta indica</i>	<i>Curcuma longa</i> rhizome, <i>Azadirachta indica</i> leaves, <i>Ocimum sanctum</i> leaves, Cabaoxy methylcellulose, Propylparaben, Methylparaben, Sucrose syrup	Antimicrobial, Tuberculosis
Polyherbal Suspension against Inflammatory Bowel Disease	Burma dhaniya ( <i>Eryngium foetidum</i> ), Sapota ( <i>Manilkara zapota</i> ), Curry leaves ( <i>Murraya koenigii</i> )	Inflammatory bowel disease
Polyherbal formulation of agarics bisporus powder	Agarics bisporus powder, tween 80, sodium CMC, sodium benzoate, suger free gold, lemon oil.	Antihyperglycemic effect
Poyherbal suspension of antiarthritic activity	Seed coat& kernel of <i>T. chebula</i> , <i>T. bellirica</i> , dry fruits of <i>E. officinalis</i> , FCA, HCL	Antiarthritic activity
Polyherbal suspension of aloe barbadensis, salix tetrasperma, tenacetum parthenium	<i>Aloe barbadensis</i> , salix tetrasperma, tenacetum parthenium, tween 80, sodium CMC sodium benzoate, sorbitol, lemon oil	Anti-inflammatory, antioxidant
Hepatoprotective polyherbal suspension	<i>M. charantia</i> , <i>F. chloroform</i> , <i>N. jatamansi</i> pet ether, <i>F. asafoetida</i> , tween 80, sodium CMC, sucrose, sorbitol, methyl paraben, lemon oil	Hepatoprotective
Polyherbal suspension for antispasmodic activity	<i>Rubia cordifolia</i> , abies webbiana, plumbago zeylanica, tween80, sodium CMC, sucrose, Methyl paraben	Antispasmodic efficacy
Immunomodulatory polyherbal suspension	<i>Nelumbo nucifera</i> , <i>Euryale ferox</i> , <i>Trapa natans</i> , hydroethanol	Immunosuppression
Polyherbal suspension used in gastric acidity	<i>Glycyrrhiza glabra</i> Linn, <i>Terminalia chebula</i> , <i>Terminalia belerica</i> , <i>Emblica officinalis</i>	Antiacidic activity
Polyherbal suspension	Varatika, dugdhpashana, mouktika sukta	Flatulence, dyspepsia, heartburn, hyperacidity

**Table 4:** Polyherbal formulations of cream [48-57]

Name	Ingredient	Pharmacological action
Antioxidant face cream	<i>Psidium guajava</i> , <i>Ocimum gratissium</i> , steric acid, liquid paraffin, soft paraffin, methyl paraben, propyl paraben orange oil	Antioxidant, antiseptic, anti-inflammatory, antimicrobial
Polyherbal cream	<i>Azadirachta indica</i> , <i>Equisetum arvense</i> , <i>Emblica officinalis</i> , <i>Eugenia caryophyllus</i> , <i>Zingiber officinalis</i> , <i>Trigonella foenum-graecum</i> , <i>Aloe vera</i> , bee wax	Anti-inflammatory, analgesic
Topic polyherbal formulation for antimicrobial potential	Manjishta, guduchi, aloe extract, neem oil, moringa oil	Antioxidant, anti-inflammatory antibacterial, antifungal,
A polyherbal cream agains rheumatoid arthritis	<i>Nyctanthes arbor-tristis</i> , <i>Eugenia caryophyllus</i> , <i>Zingiber officinale</i> , bees wax, white soft paraffin, borax, methyl paraben, menthol	Reduce joint pains
Polyherbal face cream	<i>Aloe vera</i> , <i>Brassica oleracea</i> , <i>Curcuma longa</i> , <i>Daucus carota</i> , <i>Emblica officinalis</i> , <i>Glycyrrhiza glabra</i> , <i>Solanum lycopersicum</i> , steric acid, almond oil, glycerol, methyl paraben, triethanolamine	Antiacne, antiwrinkle, antiaging
Polyherbal cosmetic cream	Almond oil, night jasmine, neem leaves, besan powder, bees wax, borax, methyl paraben, rose water	Protect the skin from endogenous and exogenous harmful agent
Formulation of ethanolic extract of polyherbal face cream	<i>Aloe vera</i> , <i>Azadirachta indica</i> , <i>Curcuma longa</i> Linn, menthe <i>Piperata</i> Linn, stericacid, liquidparaffin, beeswax, borax, glycerine, roseoil, methylparaben	Protect skin against damage and prevent dry skin
Formulation of vanishing plus fairness expert cream	Neem, orange peel, <i>Curcuma longa</i> , peppermint leaves, mustard seed, ginger, almond powder, honey, gram flour, steric acid, potassium hydroxide, sodium carbonate, glycerin.	Antiageing, vanishing
Antiaging polyherbal cream	Punica extract, neem oil, eucalyptus oil, jamul powder, glycerine, propylene glycol, methyl cellulose, sodium alginate, beeswax, grape seed oil, almond oil, carrot powder, lemon grass oil, rose oil	Avoid aging of skin
Polyherbal cream on diabetic foot ulcers	<i>Glycyrrhiza glabra</i> , <i>Musa paradisiaca</i> , <i>Curcuma longa</i> , <i>Pandanus odoratissimus</i> , <i>Aloe vera</i> , <i>Cocos nucifera</i> oil,	Effective for treatment of diabetic foot ulcers

**Table 5:** Polyherbal formulations of Handwash [58]

Name	Ingredient	Pharmacological action
Antibacterial Activity of Polyherbal Hand Wash	<i>Tridax procumbens</i> , <i>Azadirachta indica</i> , <i>Glycyrrhiza glabra</i> , and <i>Hibiscus rosa-sinensis</i> , Lemon Water, Sodium Lauryl Sulphate, Glycerin, Strawberry oil	Against various skin infections

**Table 6:** Polyherbal formulations of mouthwash [59]

Name	Ingredient	Pharmacological action
Polyherbal Mouthwash Containing <i>Psidium guajava</i> L	<i>Psidium guajava</i> , <i>Curcuma longa</i> , <i>Syzygium aromaticum</i> , Sucrose, Salt Solution, Sodium Benzoate	Reduce tooth decay, reduce plaque, gingivitis, cavities and bad breath

**Table 7:** Polyherbal formulations of capsule <sup>[60]</sup>

Name	Ingredient	Pharmacological action
Polyherbal hepatoprotective formulation	<i>Andrographis paniculata</i> , <i>emblica officinalis</i> , <i>Curcuma longa</i> , mannitol	Hepatoprotective activity
Polyherbal triphala	<i>Terminalia chebula</i> , <i>Terminalia bellerica</i> , <i>Emblica officinalis</i>	Help in digestion
Acidon polyherbal capsule	Hingwastak churna, Lavan bhaskar churna, katuki churna, swarjika kshar	Used to fight free radical damage, dyspepsia
Polyherbal antacid capsule	Badi harad, pudina, patpita, avipattikar churna	Heartburn, gastritis

**Table 8:** Polyherbal formulations of syrup <sup>[60]</sup>

Name	Ingredients	Pharmacological action
Polyherbal antacid syrup	Shatavari, yashtimadhu, gulab, brahmi, kapurkachali, swarjika kshar, sunthi	Antiulcer
Tonacid syrup	Guduchi panchang, yashtimadhumool, punarnavamool, amalkali fruit, ajwayan ras, sutsekhar ras, shatavati mool	Cures constipation, antispasmodic
Active antacid	Trivirt, bhringaraj, guduchi, yashtimadhu	Relief from gas
Acivin antacid syrup	Ficus glomerata, rubia cordifolia, hemidesmus indicus, cuminum cyminum,	Quick relieves heartburn

**Table 9:** Examples of PHFs that are sold

Product name	Manufacturer company	Ingredients	Pharmacological action
Tulsi Capsules	Baidyanath	<i>Ocimum sanctum</i>	Immunomodulator, adaptogen
Triphala Churna	Dabur	<i>Emblica officinalis</i> , <i>Terminalia chebula</i> , <i>Terminalia bellerica</i>	Digestive aid, laxative, antioxidant
Arjuna Capsules	Himalaya	<i>Terminalia arjuna</i>	Cardioprotective, anti-hypertensive
Ashwagandha Tablets	Patanjali	<i>Withania somnifera</i>	Adaptogen, stress-relief, immunomodulator
Diabet	Herbal Galenicals, India	<i>Curcuma longa</i> , <i>Coscinium fenestratum</i> , <i>Strychnos potatorum</i> , <i>Tamarindus indica</i> , <i>Tribulus terrestris</i> , <i>Phyllanthus reticulatus</i>	Antidiabetic
Livokot	Nagarjuna Herbal Concentrates Ltd., India	<i>Picrorhiza kurroa</i> , <i>Andrographis paniculata</i> , <i>Eclipta alba</i> , <i>Phyllanthus niruri</i> , <i>Terminalia arjuna</i> , <i>Cichorium intybus</i> , <i>Boerhaavia diffusa</i> , <i>Tephrosia</i>	Hepatoprotective, enhances liver function
Amla Hair Oil	Forest Essentials	<i>Emblica officinalis</i> , <i>Sesamum indicum</i>	Nourishes hair, promotes hair growth
Brahmi Ghrita	Baidyanath	<i>Bacopa monnieri</i> , <i>Aegle marmelos</i> , <i>Gmelina arborea</i> , <i>Cyperus rotundus</i>	Nootropic, memory enhancer, neuroprotective
Trikatu Tablets	Zandu	<i>Piper longum</i> , <i>Piper nigrum</i> , <i>Zingiber officinale</i>	Digestive stimulant, metabolism booster
Shatavari Syrup	Dhootapapeshwar	<i>Asparagus racemosus</i>	Female reproductive tonic, hormonal balance
Gokshura Capsules	Himalaya	<i>Tribulus terrestris</i>	Diuretic, libido enhancer, urinary tract support
Liv-Tone	Charak Pharma	<i>Phyllanthus niruri</i> , <i>Picrorhiza kurroa</i> , <i>Andrographis paniculata</i> , <i>Boerhaavia diffusa</i>	Hepatoprotective, supports liver function
Triphala Guggulu	Himalaya	<i>Emblica officinalis</i> , <i>Terminalia chebula</i> , <i>Terminalia bellerica</i> , <i>Commiphora wightii</i>	Lipid-lowering, anti-inflammatory, supports joint health
Brahmi Oil	Kama Ayurveda	<i>Bacopa monnieri</i> , <i>Sesamum indicum</i>	Nourishes scalp, promotes hair growth, improves cognitive function
Ashoka Capsules	Baidyanath	<i>Saraca indica</i>	Uterine tonic, supports female reproductive health
Punarnavadi Guggulu	Dabur	<i>Boerhaavia diffusa</i> , <i>Tinospora cordifolia</i> , <i>Zingiber officinale</i> , <i>Piper longum</i>	Diuretic, anti-inflammatory, supports kidney function
Yashtimadhu Churna	Zandu	<i>Glycyrrhiza glabra</i>	Anti-inflammatory, gastroprotective, respiratory health
Brahmi Capsules	Organic India	<i>Bacopa monnieri</i>	Cognitive enhancer, stress relief, adaptogen
Shankpushpi Syrup	Dhootapapeshwar	<i>Convolvulus pluricaulis</i>	Nervine tonic, memory enhancer, stress relief

In formulating polyherbal preparations, it is imperative to consider that certain herbs may be deemed incompatible (*viruddha*) and, as a result, should not be combined. This incompatibility can arise from factors such as quantitative differences, energetic disparities, or functional incongruities. For example, ghee and honey not ought to be consumed in equal weight-based proportions because of varying tastes and temperatures. Similarly, the combination of laxatives and astringents may lead to antagonistic actions, where their effects counteract each other.

Ensuring the compatibility of multiple herbs in polyherbal formulations requires well-designed clinical trials before they are introduced to the market.

### Reason of using PHF

As previously mentioned, PHFs, or polyherbal formulations, have recently become well-known throughout the world due to their unique advantages not found in allopathic medications. To begin with, PHFs are recognized for their high efficiency across a wide variety of illnesses. The medicinal effects of herbal remedies arises from the presence of diverse phytoconstituents, and this effect is enhanced when compatible herbs are combined in PHFs. Numerous research research assessing the effectiveness of PHFs have been conducted and published in international journals. For example, Srivastava *et al.* reported several PHFs that are anti-diabetic, such as Diasulin, Diabet, Dianex, DRF/AY/5001, Diashis, Diabrid, Diakyur, and so on demonstrated compatibility comparable to standard allopathic drugs. A statistical study conducted in the UK revealed that the efficacy and favorable results of the treatment are the main justifications for using medicinal herbalism [1-2].

Furthermore, PHFs often exhibit a wide spectrum of medicinal applications. Many are safe at large doses and effective at low ones, resulting in a superior risk-to-benefit ratio. For instance, the PHF with hypoglycemia "Diakyur" used in diabetes is a notable example. Joshi *et al.* conducted an sudden toxicity test, revealing that Diakyur given orally at a dose of 12800 mg/kg. Showed experimental animals showed no harmful signs for up to 72 hours. Subsequent subacute poisoning tests demonstrated that a long-term dose of 1600 mg/kg p.o. of this PHF is safe. Their further study confirmed the PHF's antioxidant and hypoglycemic effects at 1600 mg/kg (p.o.). This contrasts with sulfonylureas, allopathic hypoglycemic medications with a limited therapeutic range, include glipizide, gliclazide, and tolbutamide.

Frequently, properly manufactured and utilized polyherbal formulations (PHFs) tend to produce fewer drawbacks in contrast to allopathic medications. Despite the design of modern allopathic drugs for effective therapeutic outcomes, the administration of many of them is associated with undesirable side effects. These can include vomiting, exhaustion, dry mouth, diarrhea, seizures, and sleeplessness impotence, disorientation, baldness, and organ toxicity, and, in severe cases, even death. Individuals non-steroidal anti-inflammatory medication prescription for the treatment of

rheumatoid arthritis (RA) may particularly suffer from adverse consequences related to the kidneys and gastrointestinal tract, including hypertension, dyspepsia, gastric ulcers, and retention of salt and fluid.

In contrast, patients may choose Treatment with Ayurveda, where these negative effects are either negligible or nonexistent. A year-long Using internal herbal remedies, Ayurvedic treatment was found to yield positive effects without any indication of organ toxicity in RA patients. Additionally, According to Jawla *et al.*'s study that not one of the five hundred questionnaires respondents observed negative effects of herbal medications, with 48% of them preferred the Ayurvedic system for common illnesses. It appears that the criterion of side effects significantly influences the acceptance of a medication system by the public.

Because polyherbal formulations (PHFs) are derived from their nature, they are comparatively more affordable, environmentally cordial, and easily accessible compared to allopathic drugs. Their increased affordability and widespread availability contribute to a growing global demand, particularly in certain developing nations' rural locations, where costly contemporary treatments are available may not be accessible. Additionally, polyherbal remedies have held a longstanding place in certain tribes' cultural beliefs, norms, and practices, rooted in centuries-old experiences of trials and errors. In simple terms, PHFs are more easily accepted on a social and cultural level.

Considering the factors of efficiency and security, affordability, accessibility, and cultural approval, polyherbal formulations emerge as an ideal treatment choice. This leads to higher patient compliance and ensures excellent therapeutic effects [61-64].

### Primary issues associated with the utilization of polyherbal formulations (PHFs) [21, 64, 13]

In spite of the manifold benefits that Ayurvedic polyherbal formulations (PHFs) offer to humanity, they grapple with inherent drawbacks that impact their efficacy in treatments. These challenges stem from issues related to the sources and manufacturing processes of PHFs, as well as considerations involving patients, Ayurvedic practitioners, and legal regulations.

A prevalent misconception is that PHFs from Ayurveda are always safe, a notion debunked by Charaka Samhita, which acknowledges adverse effects when Ayurvedic medicines are prepared or used improperly. The growing trend of PHF usage in combination with allopathic medications raises concerns, as many certain patients don't disclose their concomitant treatments to health professionals.

Despite this, there is a lack of awareness regarding potential drug-herb combinations, which include can impact the consequences that are toxicological or pharmacological of treatments, leading to adverse health outcomes. Several Ayurvedic herbs commonly employed in the formulation of PHFs have been reported to contribute to drug-herb interactions.



**Table 10:** Illustrates instances of potential interactions between drugs and herbs

Ayurvedic Herbs Contained in PHF	Possible Drug-Herb Interaction
Garlic ( <i>Allium sativum</i> ), Ginger ( <i>Zingiber officinale</i> ), Ginkgo ( <i>Ginkgo biloba</i> )	Interfere with NSAIDs and warfarin by increasing the risk of bleeding, mainly due to: <ul style="list-style-type: none"> <li>• Inhibition of platelet aggregation</li> <li>• Limited production of coagulation mediators</li> <li>• Antagonism of platelet activating factor</li> </ul>
St John's Wort ( <i>Hypericum perforatum</i> ) for depression treatment	Induces hepatic microsomal enzyme cytochrome P-450, thus increasing the metabolism of certain drugs such as digoxin and theophylline, rendering them less effective
Meadowsweet ( <i>Filipendula ulmaria</i> ) for anti-inflammatory action	Displaces highly protein-bound drugs such as warfarin and carbamazepine, thus increasing the adverse effects of these drugs

Achieving clinical reproducibility with Ayurvedic polyherbal formulations (PHFs) poses significant challenges. The India's Ayurvedic Pharmacopoeia, commonly referred to as the "Ayurvedic Formulary of India," publishes books outlining the process of making Ayurvedic PHFs, aiding in the standardization of their production. However, relying solely on these guidelines does not ensure the consistent consistency throughout each PHF batch. Samhita Charaka emphasizes factors to consider when selecting the starting materials for PHFs, encompassing habitat, seasonal growth, harvesting conditions, storage methods, and pharmaceutical processing. Despite these considerations, the variability in the components of unprocessed, uncooked herbal materials persists due to different locales, weather patterns, environmental elements, methods of harvesting, and procedures for collection. Consequently, achieving standardized end products with reproducible quality becomes challenging, leading to batch-to-batch variations. Such variations directly impact the efficacy and security of PHFs. Furthermore, the necessity to adjust the dosing schedule for achieve the necessary healing outcome adds to the complexity of the process.

The issue of toxicity in herbal compositions from Ayurveda persists and remains unresolved. In mainstream pharmaceuticals, the existence of heavy metals, even in trace amounts, is strictly prohibited to prevent toxicity. In contrast, a significant number of Ayurvedic polyherbal formulations (PHFs) practice the concept of Rasa Shastra, incorporating metals for their therapeutic applications, resulting in the formation of Herbo-bio-mineral metallic formulations are called rasasadhies. These formulations claim to possess inherent attributes like rapid activity, lower dosage requirements, lack of taste, extended prolonged shelf life and enhanced Taste.

Specialists estimate that around 6000 medications in the "Ayurvedic Formulary" include at least one metal on purpose, such as lead and mercury being the most frequently utilized. Strong hepatotoxic, hematotoxic, neurotoxic, and nephrotoxic effects are recognized for these hazardous substances. Research studies have identified the presence of metals in a substantial quantity of Ayurvedic cases and rasasadhies of toxicity resulting from the consumption of Herbal Ayurvedic preparations have been documented over the past ten years. The The Centers for Disease Prevention and Control has additionally reported cases of pregnancy-related lead toxicity linked to Ayurvedic medicine usage, posing potential adverse effects on both of their health the mother and the youngster. Thankfully, this issue is absent in Kasthoushadhies, which are made entirely of herbs devoid of metals.

Despite the current alarming levels of toxicity cases, the response from Ayurvedic practitioners to this issue remains passive. Globally, the quantity of documented negative reactions documented through programs for pharmacovigilance is yet minimal, mostly as a result of the

misguided conviction that Ayurveda polyherbal formulations (PHFs) are invariably secure. Notwithstanding the occurrence of cases of toxicity, there is a continued assertion that the toxic effects of added heavy metals can be mitigated through Shodhana, a purification and detoxification process integral to Rasashastra.

Survey results indicate that some Indian Ayurvedic doctors are hesitant to acknowledge the adverse effects of herbal formulations, while others attribute the problem solely to improper manufacturing and irrational prescribing.

Moreover, despite the work that was forth by the Department of Homeopathy, Siddha, Unani, and Yoga and Naturopathy in India to issue guidelines for good manufacturing practices With safety regulations based on WHO recommendations, the inadequate Putting regulatory restrictions in place has created room for failing to comply with these rules. This lax oversight has resulted in various issues, including undetected adulteration, substitution, contamination, and the adoption of shortcuts during the manufacturing process.

These lapses have led to occurrences like the inadvertent synthetic anti-inflammatory drug content in Ayurvedic remedies intended for arthritis treatment, excessive contamination of products with heavy metals, and the absence of correctly handling, storing, and processing marketed goods under unfavorable circumstances. These concerns highlight the urgent need for stricter regulatory measures and enhanced enforcement to guarantee the effectiveness, safety, and caliber of Ayurvedic herbal concoctions in India [65-68, 35].

## Conclusion

The enduring popularity of Ayurvedic Personal Health Formulations (PHFs) is rooted in their holistic approach to disease treatment, aligning with Ayurvedic principles such as Panchamahabhutas and Tridoshas. Scientific advancements have refined these formulations by exploring phytoconstituents and identifying synergistic herbal combinations, enhancing their efficacy as credible alternatives to allopathic drugs [69].

The current global resurgence of Ayurvedic PHFs reflects their commendable efficacy, fewer side effects, and increased acceptance compared to conventional medications. However, challenges persist, including a lack of public knowledge and misconceptions about their safety, potentially leading to unintended consequences like toxicity. Addressing this requires robust public education to foster a nuanced understanding of Ayurvedic treatments [70].

Additionally, concerns arise from poor regulatory control and irresponsible manufacturing practices, posing risks to the quality and safety of PHFs. To mitigate these issues, stringent regulatory measures and increased oversight are imperative to ensure Ayurvedic products meet established standards and safeguard consumers [68].

In conclusion, while Ayurvedic PHFs have proven efficacy and safety, their optimal impact on human health requires

ongoing scientific research, strong regulatory frameworks, and comprehensive public education. With an informed and responsible approach, Ayurvedic PHFs can significantly contribute to global health and well-being <sup>[71]</sup>.

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