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Review ETPM

Herbal Medicines and Complementary Therapies: Their Roles, Types, and Applications

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Abstract

Medicinal plants are used in herbal medicine to treat and prevent illnesses. This includes the use of standardized and titrated botanical extracts in addition to common and traditional medicines from different cultures. The safety of a treatment may be suggested by its long history and deep cultural roots in traditional medical systems, but this does not always imply that it is effective. This is especially important in herbal medicine, since conventional treatments frequently use very low or ultra-low concentrations of active substances or are predicated on energy or magical concepts. In today's globalized world, the relevance of evaluating the "transferability" of treatments across cultures is limited in clinical research. Instead, the focus should be on assessing efficacy and safety using the rigorous standards of mainstream clinical medicine. Another significant challenge in herbal treatments is the incomplete understanding of the precise composition of herbal extracts. To address this, modern biological technologies, such as pharmacogenomics, metabolomics, and microarray methodologies are essential for thoroughly evaluating the pharmacological properties and safety of herbal remedies. Given the widespread and increasing global use of plant-derived substances, it is unwise to rely solely on traditional practices or supposed millennia-old beliefs. Both explanatory and pragmatic studies play a crucial role in generating reliable data, benefiting both healthcare providers and patients. Traditional medicine encompasses the entirety of practices rooted in the theories, beliefs, and experiences of various cultures and historical periods. Often enigmatic or not easily explained, these practices are used to maintain health and support the prevention, diagnosis, management, and treatment of illnesses. In every country, traditional medicine is often influenced by magical or religious beliefs, as well as collective popular experience. The World Health Organization (WHO) is actively working to develop comprehensive guidelines for clinical research methodologies and the evaluation of the effectiveness of traditional medicine practices.

Keywords: Science based medicine, phytomedicine, botanical medicine, herbal therapy, real world trials

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INTRODUCTION

Herbal medicines, also referred to as herbal remedies, herbal medicinal products, phytopharmaceuticals, phototherapeutic agents, or phytomedicines, encompass a diverse range of therapies with demonstrated benefits in preventing and treating various ailments. Today, herbal medicines are increasingly used alongside modern medicine in many countries, playing a significant role in healthcare.

There are several reasons why herbal medicines are becoming more and more popular, such as the growing expense of contemporary medical care, worries about the negative effects of synthetic medications, and a growing trend toward natural

therapies as part of the alternative healthcare movement. Because of its long-standing dependability and affordability, over 80% of people in underdeveloped nations receive their primary treatment from herbal and other traditional remedies. The World Health Organization (WHO) plays an active role in encouraging and supporting the integration of herbal and traditional therapies within National Health Care Programs. These treatments are not only widely available and reasonably priced, but they are also regarded as reasonably safe, and many individuals have a great deal of faith in their efficacy [1, 2].

Traditional, Complementary, and Alternative Medicine (TCAM) encompasses a broad spectrum of health practices and products that are typically outside the scope of conventional medicine. TCAM approaches can be used alongside or in place of conventional treatments. However, while these therapies have widespread use, they may also carry risks, including adverse reactions or other harms, underscoring the need for careful evaluation and regulation. Determining the global market size for herbal products is challenging due to the lack of standardized regulations governing their sale, resulting in limited availability of accurate statistics. As of 1988, only 14 WHO member countries regulated the sale of herbal products. By 2003, this number had grown to 67 countries, with an additional 42 working toward developing regulations.

The WHO estimates that 75% of the global population has utilized herbal products for therapeutic purposes. A 2004 survey revealed that over one-third of American adults use alternative medicine, fuelling a significant expansion of the herbal product market in the United States. Globally, the sales of medicinal plants, crude extracts, and finished products were valued at $15 billion in 1999, rising to $32 billion by 2002. The World Bank projects that with annual growth rates of 5–15%, the current global market for herbal products is approximately $60 billion per year. Ensuring the quality of herbal products is a complex task that involves stringent processes to maintain consistency within established parameters. This article highlights the potential of natural flora in the development of evidence-based applications for herbal medicine [3].

In this second installment of our series on systematic reviews of complementary therapies, we focus on herbal medicines. These are preparations derived from plants and fungi, often through processes like alcoholic extraction or decoction, and are widely used for the prevention and treatment of diseases. Herbal medicines form a vital component of traditional medicine across cultures and have a significant presence in industrialized nations. In countries like Germany, herbal preparations marketed as drugs have a longstanding tradition, with prescription and sales figures remaining stable or slightly declining. In contrast, in the US and UK, herbal medicinal products are typically marketed as “food supplements” or “botanical medicines,” and their sales have grown significantly in recent years. In developing countries, herbs are predominantly utilized by traditional healers.

Herbal therapy is one of the many popular and controversial complementary therapies. A thorough overview of systematic studies on herbal medicine is what this page seeks to provide as part of a larger assessment of the three main complementary therapies of homeopathy, herbal medicine, and acupuncture. Utilizing Medline, the Cochrane Library, the Cochrane Complementary Medicine Field Registry, and the bibliographies of pertinent books and publications, pertinent reviews were found. In order to be included for analysis, the articles had to be published, examine prospective clinical trials of herbal medications, clearly explain their review procedures, and concentrate on treatment effects. Using a standardized form, information on the circumstances, interventions, techniques, outcomes, and conclusions was retrieved and descriptively summarized. In contrast to pharmaceuticals, herbal remedies typically do not qualify for patent protection. This diminishes the motivation for pharmaceutical companies to invest in clinical trials. Many herbal medicine manufacturers are relatively small and lack the research resources and expertise of larger pharmaceutical companies. As a result, the quality of many earlier trials on herbal medicines has been low. Additionally, negative trial results that could harm smaller companies are less likely to be published, further complicating the evidence base [4, 5].

CATEGORIES OF HERBAL AND COMPLEMENTARY MEDICINES

The Standard of Traditional and Complementary Medicines

Notwithstanding the possible advantages of herbal remedies, several reports point to serious adverse effects. Furthermore, the low quality of many herbal medicines is highlighted by the discovery of heavy metals in several items used in Ayurvedic and Traditional Chinese Medicine. Despite their well-established benefits, these products are frequently promoted as dietary supplements or medications, with or without therapeutic claims, which raises questions regarding their safety and quality. Numerous surveys addressing regulatory concerns pertaining to herbal medicines have been carried out by the World Health Organization (WHO). Many countries have started setting up regulatory bodies to evaluate the efficacy and safety of herbal products, according to a 2005 global survey that covered 141 countries. The WHO has released guidelines to further improve safety and quality by enhancing pharmacovigilance, consumer information [6].

Regulation and Standardization of Traditional and Herbal Medicines

Standardized herbal medicines offer several advantages over unstandardized extracts, primarily by ensuring the accurate identification of the herb and confirming that it is as claimed. Additionally, the use of herbal products with well-defined constituents is essential for conducting clinical trials. Over the past 50 years, advancements in chemical and biological techniques have provided scientific evidence to support the use of herbal products, enabling manufacturers to develop standardized, evidence-based formulations.

Standardization is the process of ensuring consistency in a product's claimed efficacy and its reproducibility across batches. However, this process faces significant challenges, including variations in the source material, lack of comprehensive safety evaluations, and difficulties in quality control. Unlike synthetic drugs, which have well-defined constituents, many herbs contain unknown active components, making standardization more complex.

Regulation and Standardization of Traditional and Herbal Medicines

1. *Active Constituent Extract:* In this approach, the therapeutic biochemical compounds are known and isolated for standardization. However, this method has limitations, as it focuses solely on isolated compounds, potentially overlooking the synergistic or buffering effects of other components in the herb.
2. *Marker Extract:* This approach is used when the active principle is unknown or partially known, or when the preparation involves multiple crude drugs or extracts. In this case, the complete formulation is regarded as active, and the presence of additional medicinal ingredients is indicated by a distinctive molecule. Because markers are not specific to a single plant, unlike isolated chemicals, they can be used in complicated formulations.

Herbal medicine standardization is more than just an analytical procedure that looks for and measures active ingredients. Rather, it comprises a thorough method that incorporates all required data and safeguards to guarantee compositional consistency. This is accomplished by maintaining product efficacy and quality by utilizing contemporary analytical instruments and methodologies [7].

Quality Assurance Strategies

The first step in ensuring the therapeutic efficacy of herbal medicines is verifying the product's composition using authenticated pharmacogenetic methods. This includes identifying the herb through its scientific nomenclature, understanding the specific plant parts used, and determining the percentage of those parts. The metabolites of herbs can vary due to factors, such as ontogenetic, ectopic, genotypic, and chemotypes influences. Other variables, such as growth conditions, plant age, harvesting time, drying methods, and storage conditions, also play a critical role. By producing standardized raw materials through the application of Good Agricultural and Collection Practices (GACP), these factors can be controlled. Assessing the physicochemical qualities of raw materials, such as colour, Odor, microscopic features, drying loss, moisture content, and ash values, is necessary for quality control.

Because of documented poisoning incidents connected to herbal treatments, heavy metal testing is very important. Furthermore, verified techniques must be used to track fertilizer, pesticide, and herbicide residues. Fourier Transform Infrared (FTIR) or Attenuated Total Reflectance Infrared (ATR-IR) spectroscopy is a vital non-destructive tool for assessing the quality of crude herbal powders on a solid matrix. Comparing the FTIR spectra of a sample to reference spectra is an efficient technique for evaluating the sample's suitability [8].

For analysing extracts and finished products, advanced instrumental techniques are employed, including:

- *Spectroscopic Techniques:* FTIR/ATR-IR and Nuclear Magnetic Resonance (NMR).
- *Chromatographic Methods:* Techniques, such as high-performance liquid chromatography (HPLC), gas chromatography (GC), high-performance thin-layer chromatography (HPTLC), and hybrid methods like gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS).

These methods ensure the safety and quality of herbal medications by supporting both qualitative and quantitative investigation (Figure 1) [9].

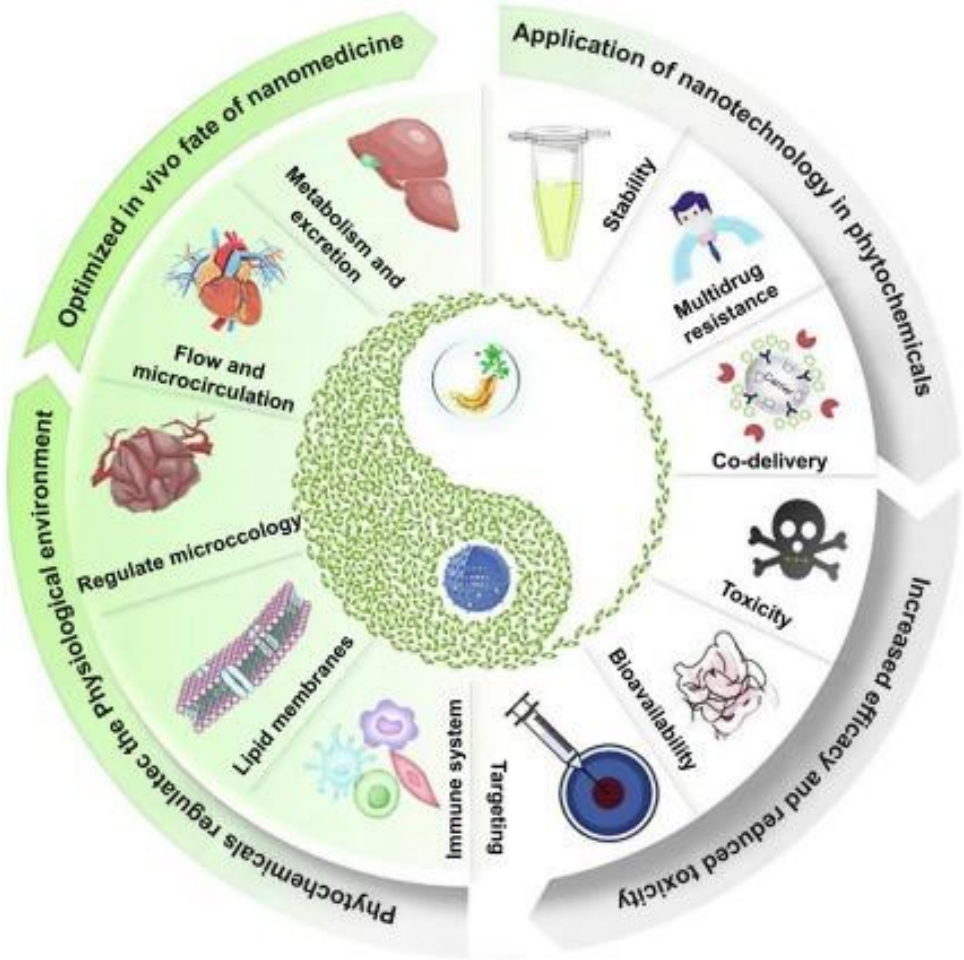

Figure 1. Schematic representation of herbal medicines cycles.

METHODS OF HERBAL MEDICINES

MEDLINE (via Ovid software; Ovid Technologies Inc., New York, NY) was used in January 1998 to do systematic automated literature searches for articles from 1966 to 1996. Due to insufficient indexing at the time of the study, articles published in 1997 were not included. The goal of the search

was to increase the medical subject heading "alternative medicine" (AM) to retrieve the quantity of publications pertaining to complementary medicine. The four main complementary therapies that fall under AM – "traditional medicine" (which mostly refers to traditional herbal medicine), "acupuncture", "homeopathy," and "chiropractic" – were also searched separately [10].

For both AM and the individual therapies, searches were designed to identify the number of articles across three categories:

1. *All Journals Indexed in MEDLINE:* The overall count of articles included in the MEDLINE database.
2. *Clinical Trial-Type Articles:* Articles indexed as one or more of the following publication types: clinical trial (phases 1–4), controlled clinical trial, meta-analysis, or randomized controlled trial, limited to human trials.
3. *Focus Journals:* A subset of 33 journals specializing in general or internal medicine with an impact factor of 1 or higher, chosen for their influence among healthcare professionals.
4. These searches identified the number of articles published annually from 1966 to 1996.

The following metrics were computed for each search:

- Total number of articles.
- Number and proportion of clinical trial-type articles (as a percentage of the total).
- Number and proportion of articles published in focus journals.

Additionally, to compare the growth of AM articles with the overall growth in MEDLINE-listed articles, a separate search was conducted to determine the total number of MEDLINE-listed articles published annually. All retrieved data were taken at face value, with no attempt to verify whether each "hit" corresponded to a true article on the specified topic or a clinical trial report (Figure 2).

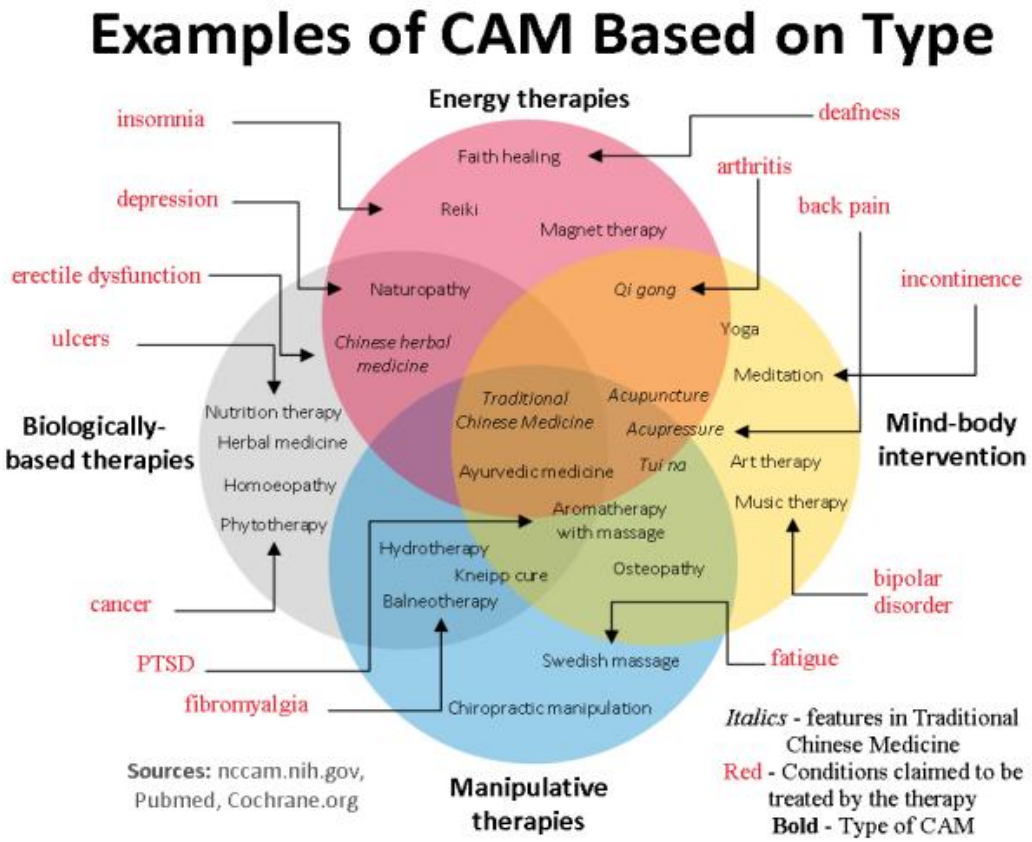

Figure 2. Examples of CAM based on type.

PHARMACIST AND HERBAL MEDICINES

Studies conducted in the UK, USA, and Australia have shown that pharmacists frequently play a key role in supplying herbal medicines. Consumers are often influenced by misleading claims about herbal products, which may lead them to use these remedies alone or in combination with other medicines, potentially causing clinical complications.

Pharmacists, as drug specialists, can play a key role in promoting public health by educating the public on the correct use of herbal medicines. To offer sound advice, pharmacists must be well-informed about the safety, toxicology, potential side effects, antidotes, and interactions of these products.

To provide thorough information about herbal products, including information on composition, safety, dosage, dosing intervals, mechanisms of action, and possible interactions with other herbs and pharmaceuticals, pharmacists, the herbal industry, and regulatory bodies must work together. Access to trustworthy data is also essential. Studies have shown how important it is to have accurate information on the efficacy, safety, and quality of herbal medicines. Data pertaining to therapeutic medication monitoring is necessary since herbal remedies may also obstruct diagnostic markers, resulting in incorrect disease assessments [11, 12].

Pharmacists have long been an important resource for information on natural supplements and are recognized as such by consumers. Integrating herbal medicinal knowledge into pharmacy school curricula is important due to the growing use of herbal products as complementary therapies. This knowledge helps differentiate between harmless or beneficial effects and potentially harmful interactions. The Accreditation Council for Pharmacy Education (ACPE) considers teaching students the basics of nutrition and non-drug therapies an essential professional competency. However, pharmacy schools are still not providing sufficient training in this area (Figure 3).

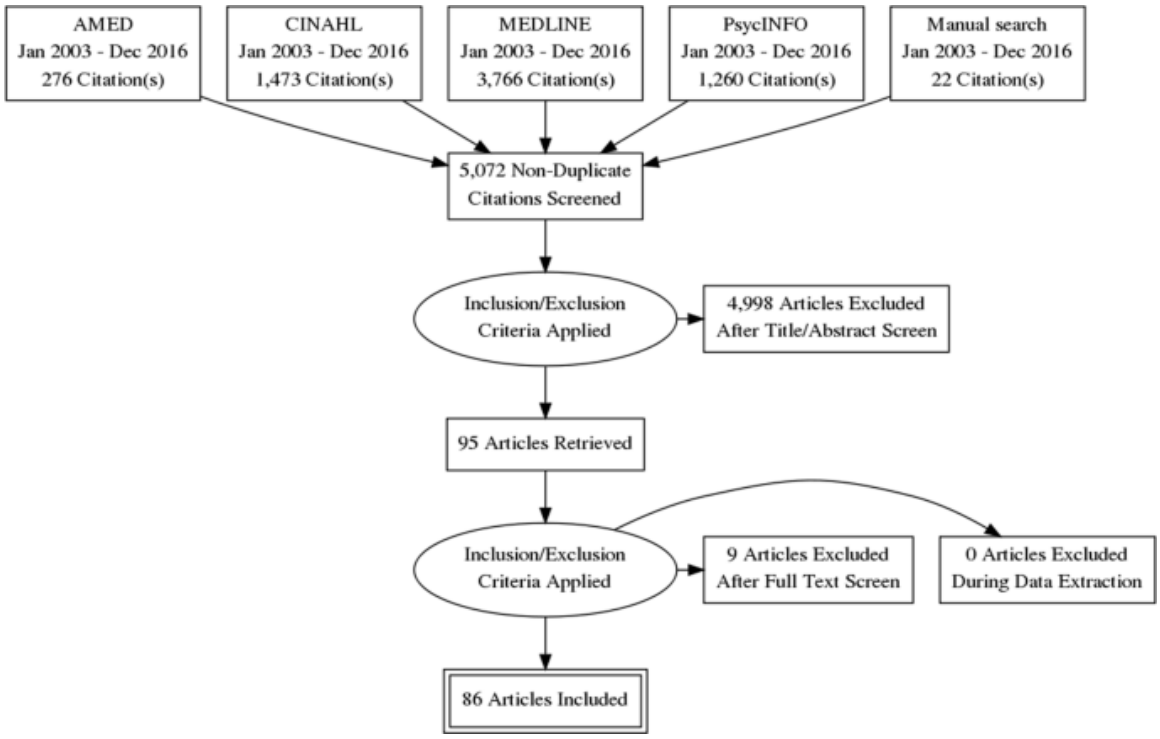

Figure 3. Complementary medicine uses to medical providers.

Role of the Pharmacist in the Use of Herbal Medicine

The role of pharmacists has evolved to encompass a broader clinical application of pharmacotherapy as part of the healthcare team. In many settings, pharmacists are uniquely positioned to advise on and

monitor the use of herbal medicines, particularly in older adults. Acknowledging this broadened responsibility, the World Health Organization (WHO) released a technical report in 1998 entitled "The Role of Pharmacists in Self-Care and Self-Medication." This document outlines the pharmacist's role in patient self-care and self-treatment, which is one of the key components of good pharmacy practice.

Herbal medicines are commonly utilized, with around 80% of the world's population depending on them. Their popularity is attributed to their perceived safety, efficacy, cultural acceptance, and fewer side effects compared to prescription medications. Herbal medicines are considered affordable and readily available. In recent years, there has been a notable rise in the use of herbal products (Figure 4) [13].

While herbal medicinal products may offer therapeutic benefits, many also cause adverse effects and drug interactions like conventional medications. Those with limited therapeutic windows should be especially concerned about the possibility of interactions between herbs and traditional medications. Thus, knowing the effectiveness and safety of herbal remedies is essential. One of the major concerns associated with herbal medicines is the misconception among patients that, since herbs are natural, they are completely safe and free from any side effects. Patients must be made aware of how important it is to use herbal medicines with prudence. Asking patients about their usage of herbal products and sharing this information with other medical professionals is a crucial role that pharmacists can play. Pharmacies should stock only herbal products that comply with Good Manufacturing Practice (GMP) standards. Pharmacists should also keep an eye out for any negative effects in patients who use herbal products (Figure 5) [14].

Due to the therapeutic components of terrestrial medicinal plants, herbal medicines have been utilized for ages to cure human ailments. Various plant parts, including as seeds, roots, leaves, bark, blossoms, and whole herbs, as well as fresh juice, gums, oils, and resins, have been used to make these medicines for a long time. The bioactive compounds included in these ingredients are what give herbal products their health advantages. According to the World Health Organization (WHO), around 80% of the global population relies on herbal medicines for primary healthcare. Over the last decade, interest in plant-based drugs, particularly those derived from plants with therapeutic properties, has surged [15].

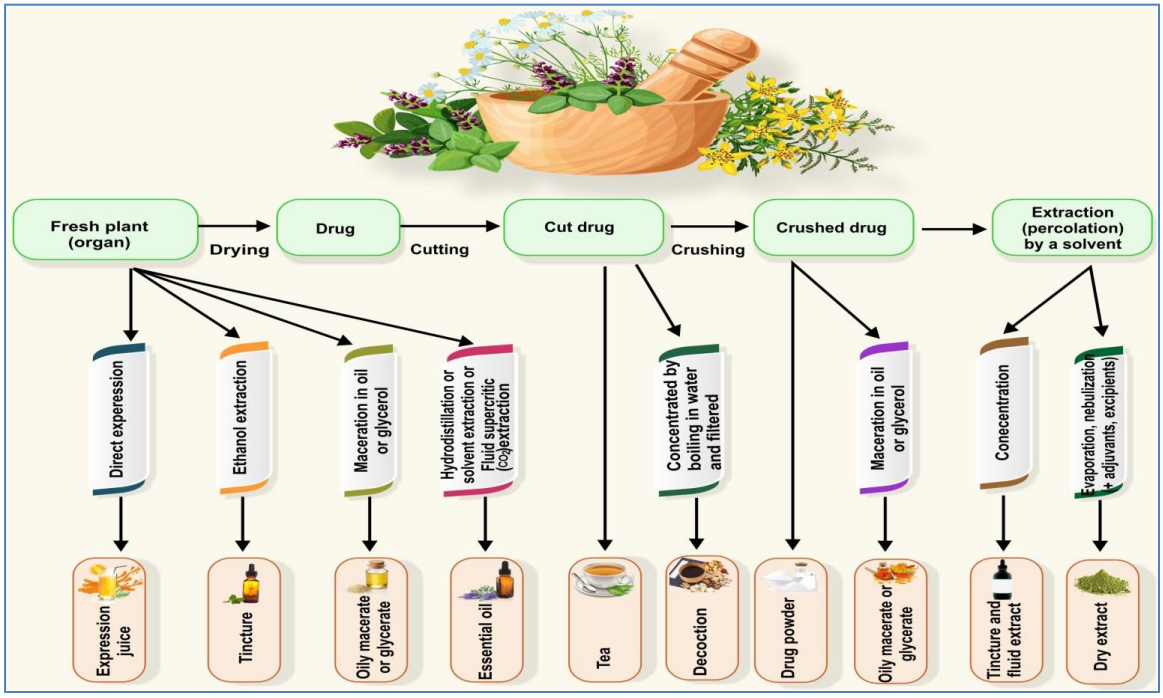

Figure 4. Types of Herbal medicines.

Table 1. Important potential interactions between herbal preparation and conventional drugs.

Herb	Conventional Drug	Potential Problem
Echinacea used for >8 weeks	Anabolic steroids, methotrexate, amiodarone, ketoconazole	Hepatotoxicity
Feverfew	Non-steroidal anti-inflammatory drugs	Inhibition of herbal effect
Feverfew, garlic, ginseng, gingko, ginger	Warfarin	Altered bleeding time
Ginseng	Phenelzine sulphate	Headache, tremulousness, manic episodes
Ginseng	Estrogens, corticosteroids	Additive effects
St John's wort	Monoamine oxidase inhibitor and serotonin reuptake inhibitor antidepressants	Mechanism of herbal effect uncertain. Insufficient evidence of safety with concomitants, therefore not advised
Valerian	Barbiturates	Additive effects, excessive sedation
Kyushin, liquorice, plantain, uzara root, hawthorn, ginseng	Digoxin	Interference with pharmacodynamics and drug level monitoring
Evening primrose oil, borage	Anticonvulsants	Lowered seizure threshold
Shankapulshpi (Ayurvedic preparation)	Phenytoin	Reduced drug levels, inhibition of drug effect
Kava	Benzodiazepines	Additive sedative effects, coma
Echinacea, zinc (immunostimulants)	Immunosuppressants (such as corticosteroids, cyclosporin)	Antagonistic effects
St John's wort, saw palmetto	Iron	Tannic acid content of herbs may limit iron absorption
Kelp	Thyroxine	Iodine content of herb may interfere with thyroid replacement
Liquorice	Spironolactone	Antagonism of diuretic effect
Karela, ginseng	Insulin, sulphonylureas, biguanides	Altered glucose concentrations. These herbs should not be prescribed in diabetic patients

Figure 5. Herbal remedies are available in a wide variety of formulations.

In many cultures, including Chinese, Indian (Ayurveda, Siddha, Unani, and homeopathy), Middle Eastern, Russian, and others, herbal medicines have been essential to traditional health systems for the prevention and treatment of a wide range of acute and chronic ailments. In herbal pharmacopeias from nations including China, India, Japan, Europe, and the US, thousands of these treatments are included. Throughout history, phytochemicals have been essential to medicine. In many developing countries,

nearly 80% of the population continues to rely on traditional medicine for their primary healthcare needs [16].

Currently, nutraceuticals and complementary and alternative medicines are preferred over modern synthetic drugs for reasons, such as better safety profiles, cost-effectiveness, and a lack of drug resistance. Herbal medicine remains the mainstay for 75–80% of the global population, especially in developing countries, where it is viewed as inexpensive, locally available, and free from significant side effects. The WHO reports that the use of herbal remedies worldwide exceeds that of conventional drugs by two to three times [17].

Many aspects of modern medicine have their roots in the ancient use of plants for therapeutic purposes, which dates back before written history. Numerous common medications have botanical origins, including morphine (from the opium poppy), digoxin (from foxglove), quinine (from cinchona bark), aspirin (from willow bark), and others. Herbal medicine has been used for centuries, but its reputation started to decline with the industrial revolution and the growth of allopathic treatment. By the mid-20th century, herbal products were largely replaced by synthetic drugs, which were more economically profitable. However, the 1960s saw a renewed interest in "natural health" and herbal products, partly due to concerns about the side effects of conventional medicines [18].

In 1992, recognizing the increasing popularity of herbal medicines, the National Institutes of Health in the United States established the Office of Alternative Medicine. The WHO also encouraged developing countries to use traditional plant medicines to address healthcare needs those modern systems had not met. The World Health Organization (WHO) defines traditional medicine, including herbal remedies, as therapeutic practices that existed before the advent of modern medicine. The increasing use of herbal medicines, however, does not come without concerns. Recent findings show that not all herbal products are safe, with severe adverse effects reported for some. Most herbal products available on the market have not undergone the drug approval process to confirm their safety and effectiveness. However, their long history of traditional use offers important insights for the selection, preparation, and application of herbal remedies. To be considered a viable alternative to modern medicine, herbal products must undergo rigorous scientific and clinical validation to prove their safety and effectiveness [19, 20].

Traditional medicines include herbal preparations as well as other substances like minerals and organic materials. Historical texts from ancient Indian, Chinese, Egyptian, Greek, Roman, and Syrian cultures, dating back more than 5, 000 years, document the use of herbal medicines. In India, classical texts, such as the Rigveda, Atharvaveda, Charak Samhita, and Sushruta Samhita have provided the foundation for herbal medicine practices. In recent years, complementary medicine has gained popularity, especially in the UK. Surveys estimate that about 33% of the population in Britain used some form of complementary medicine in 1993, with the use even higher among patients with chronic conditions like cancer, HIV, and multiple sclerosis. Complementary medicine refers to various therapeutic practices outside mainstream healthcare institutions, often based on traditional non-Western healing systems. These approaches, such as acupuncture, massage, and diet manipulation, are increasingly being used alongside conventional medicine. However, many patients still use these therapies without consulting their physicians, which has led to growing concerns about the proper integration of these practices with conventional care (Figure 6) [21, 22].

Population of Herbal Medicines

The therapeutic expertise gathered over many generations is combined with the methods of traditional healing systems in herbal medicines. For the treatment, management, and control of a variety of medical diseases, their combined experiences provide invaluable advice on the choice, preparation, and use of herbal formulations. Many infectious diseases, psychiatric problems, cancer, AIDS, diabetes, jaundice, hypertension, skin conditions, and tuberculosis have all been successfully treated with plant-based medications. In countries with rich historical traditions, such as Egypt, South America, China, and India,

plant-based treatments continue to be used for various health issues. The World Health Organization (WHO) estimates that 60% of the global population uses herbal medicine, with 80% of individuals in developing nations depending on it as their primary form of healthcare [23, 24].

Figure 6. Population of Herbal Medicines.

There is continuous research to find new therapeutic compounds from medicinal plants, and phytochemicals and their chemical analogs have produced a multitude of clinically beneficial medications for both acute and chronic illnesses. With a global value of almost $100 billion, the herbal business has enormous room for expansion. The World Health Organization (WHO) reports that the trade in raw materials, medicinal plants, and herbal medicines is growing at an annual rate of approximately 15%. Herbal medicine is becoming more and more popular because people believe that natural products are safe, reasonably priced, and easily available. But when compared to traditional medications, questions remain regarding the pharmacognosy and standardization of herbal remedies. In both industrialized and developing nations, research attempts to scientifically assess and validate herbal medications have increased throughout the last 20 years [25, 26].

The growing demand for organic and fair-trade ingredients is one of the primary factors propelling the herbal medicines market. With their emphasis on a holistic approach, ancient medical systems like Ayurveda and ancient Chinese Medicine are becoming more and more well-known worldwide. Furthermore, the demand for active compounds derived from plants that are specifically formulated to address health needs is being driven by the trend toward wellness tourism and personalized healthcare. The effectiveness and consistency of herbal medications have been enhanced by advancements in extraction and formulation technologies, including sustained-release formulations and nanoemulsion. However, without guaranteeing the accurate identification and verification of herbal raw materials, these developments cannot be fully achieved.

To investigate the characteristics of herbal materials and stop the adulteration of herbal medications and goods, analytical methods including chromatography, spectroscopy, and DNA barcoding are crucial. To validate traditional medicines and find new medicinal ingredients, cooperation between scientists, healthcare professionals, and traditional healers is essential. Research is concentrating on finding interactions that could affect drug metabolism, efficacy, or safety because of increased knowledge of herb-drug interactions. Making educated decisions about combining herbal remedies with traditional therapies requires these kinds of studies [27, 28].

Herbal Medicine Market Analysis by Source

Root extracts have long been used in traditional medicine, and their expanding scientific support is a major factor in their rising appeal in herbal therapy. Studies have demonstrated the pharmacological

advantages of substances originating from roots, such as their adaptogenic, anti-inflammatory, antioxidant, and immune-modulating qualities. Consequently, the demand for various root extracts in herbal formulations has been consistently rising. Furthermore, the growing demand for organically grown and wildcrafted roots has aided in the growth of this market niche. The leaves segment, in contrast, is expected to experience the fastest growth during the forecast period. This growth is driven by the increasing use of leaves in herbal remedies, thanks to their well-established medicinal properties, such as antioxidant, anti-inflammatory, and detoxifying effects. Leaves are gaining popularity due to their rich content of bioactive compounds, including polyphenols, flavonoids, and essential oils, which resonate with health-conscious consumers. Additionally, leaves can be used in various forms, such as teas, extracts, tinctures, and topical applications, catering to a wide range of health needs. As plant-based diets and holistic lifestyles become more popular, the demand for leaves in herbal products continues to propel market growth [29, 30].

Drivers of the Herbal Medicine Market: Increasing Use in the Cosmetic Industry

The cosmetics industry's demand for natural ingredients has been rising, fueled by growing awareness of the advantages of natural products and companies' efforts to substitute synthetic ingredients with herbal alternatives. This strong demand for natural components in personal care and cosmetic products is expected to persist in the coming years, and possibly even beyond [31, 32].

Increasing Demand from Developing Economies

In low- and middle-income countries, consultations with qualified physicians or pharmacists are rare and typically reserved for life-threatening conditions. Pharmacies often serve as a primary treatment source, where consumers can seek help from pharmacists, with or without a prescription. In these regions, medicinal herbs are typically unprocessed, dried plant parts that are used in their whole or sliced form. They are usually consumed as tea, occasionally in capsule or tablet form for internal treatment, or applied topically as a salve or poultice for external wounds [33, 34].

Rigid Guidelines Obstructing the Market Growth

Each country has its own guidelines and regulations regarding the importation and use of herbal medicines. Suppliers and manufacturers of herbal products face challenges when attempting to access various markets, as they must comply with different laws, requirements, and standards [35].

Fluctuation in Prices and Availability of Raw Materials

Deforestation and the extinction of species have made many medicinal plants scarce, making it difficult to guarantee a steady supply. Because of the large price variances that have resulted, it is challenging to standardize the cost of finished goods. This instability is exacerbated by weather fluctuations, supply problems, and rising local demand in the nations of origin. The market for herbal medicines is anticipated to expand despite these obstacles as top companies make significant investments in R&D to increase the range of products they offer. Market participants are also using a variety of tactics to increase their market presence, including the introduction of new goods, the creation of contracts, mergers and acquisitions, raising capital, and working with other businesses. Reducing operating costs through local manufacturing has become [36].

Herbal Medicine Market Top Player's Company Profiles

1. Sheng Chang Pharmaceutical Company (Taiwan).
2. AYUSH Ayurvedic Pte Ltd. (Singapore).
3. Herbal Hills (India).
4. Herb Pharm (US).
5. LKK Health Products Group Limited (Hong Kong).
6. International Chinese Body Care Houses (US).
7. KindCare Medical Center (US).
8. Pascoe Natural Medicine (Germany).

9. Bionorica SE (Germany).
10. Ming Chen Clinic (US).
11. The Center for Natural and Integrative Medicine (US).
12. Sinomedica (China).
13. Nature's Way Products, LLC (US).
14. Weleda AG (Switzerland).
15. Ginkgo Bio works, Inc. (US).
16. Nipponham Co., Ltd. (Japan).
17. Dabur India Ltd. (India).
18. Himalaya Drug Company (India).
19. Herbalife Nutrition Ltd. (US).
20. Rishiri Pharmaceuticals Co., Ltd. (Japan).
21. Caron Products & Services, Inc. (US).
22. The Herb Society of America (US).

Herbal Medicine Market Recent Developments

Organic Lemon Ginger tea was introduced in Canada in June 2023 by Traditional Medicinals, a top North American brand of botanical wellness goods. This invigorating blend features organic ingredients, such as lemon peel, ginger, hibiscus, and lemongrass. With its tangy, sweet, and slightly spicy flavor, the herbal tea is perfect for enjoying both hot and cold. Australia-based Blackmores Ltd., a producer of dietary and natural health supplements, joined together with B2B e-commerce site Udaan in January 2022 to sell its multivitamins in India. This partnership resulted in the availability of Blackmores and Blackmores Healthy Care products in independent pharmacies throughout India [37, 38].

HERBAL MEDICINE KEY MARKET TRENDS

Growing Consumption of Herbal Dietary Supplements

The use of antibiotic herbal medicines has gained significant popularity over the past decade. This trend is largely driven by consumers seeking alternatives for ailments that do not necessarily require specific treatments, such as common colds, coughs, gastrointestinal issues, and conditions like joint pain, rheumatism, and stiffness. As a result, the growing shift towards herbal remedies is expected to fuel continued market growth [39].

Growing Adoption of Technology

Technological progress in bioactive extraction is becoming increasingly widespread. Additionally, "green technologies" in this field are leading to significant sustainable practices. Green fractionation technology is particularly relevant as it allows the extraction of an analyte from a sample based on its physical or chemical properties. This specialized extraction method is commonly used for extracting botanicals [40].

CONCLUSIONS

Compared to pharmaceuticals, there is less data available on herbal medications because they are based on a variety of indigenous treatment systems, including Ayurveda, Islamic Tibbs, Siddha, Traditional Chinese Medicine (TCM), and Unani. Promoting the safe and efficient use of herbs requires scientifically and clinically confirmed information about them that covers topics, such as pharmacology, ethnopharmacology, toxicity, chemistry, botany, and clinical characteristics. However, thorough documentation is essential for scientific validation, and these old systems frequently lack it. Various resources, such as the European Scientific Cooperative on Phytotherapy, the German E. Commission Monographs, the Indian Herbal Pharmacopoeia, the British Herbal Compendium, the Hamdard Pharmacopoeia, and the British Herbal Pharmacopoeia, have provided valuable information on phytomedicines in Europe and the United States. The discussion emphasizes that case reports on the use of herbal medicines will become more and more important to guarantee patient safety, and that safe and high-quality herbal medications can be created using suitable analytical and biological techniques.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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